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FOOD INDUSTRIES

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★ HOMES OF FAMOUS FOODS

On the cover this month is shown one of the homes of "Domino" sugar, the Baltimore refinery of American Sugar Refining Co. With headquarters in New York, this company has refineries in New Orleans, Boston, Brooklyn and Philadelphia, in addition to the one in Baltimore.

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This Issue

WHAT THE DOCTORS ORDERED

Physicians and nutritionists have prescribed, through the medium of government spokesmen, higher vitamin levels for food products. Which is something easy to prescribe but not so easy to attain. It was for that reason that FOOD INDUSTRIES last month carried 32 pages of information on controlling the vitamin content of foods. And it is still for that reason that this issue contains 12 more pages on vitamins. Starting on page 55 you will find: "Precautions Must Surround Addition of Vitamin C," "Methods of Determining Vitamin B_1 in Foods," "How To Put Vitamin A into Foods Made From Flour," and "Conference Sets Course To Better National Nutrition."

NO BRUSH, NO LATHER

Perishable foods ought to be stored at humidities sufficiently high to avoid shrinkage and discoloration of the food. "So what?" you say, "that's easy." So it is, but when you do that you make conditions pleasant for mold spores and your food starts to grow whiskers. At this point, it looks like a dilemma. But wait. On page 41 is an article telling how mycostatic salts prevent mold growths at the humidities desired for perishables. The author is W. L. Mallman, professor of sanitary bacteriology, Michigan Agricultural Experiment Station, East Lansing, Mich.

IT WORRIES EVERYONE

What to do to make floors last longer in food plants? That's a problem that is about as widely discussed as the weather when food men get together. Fortunately, it is easier to control than the weather. Since causes for floor failures are definite and predictable, they are to a great extent preventable. Starting on page 37 is an article revealing the reasons that floors fail in food plants. In later issues, the author, Richard Kanegsberg, will tell you how to prevent these failures.

FRESH FROM THE IFT

The editors held three pages of this issue open until the last minute to bring you while it's still hot a report on the conference of the Institute of Food Technologists, held in Pittsburgh June 15-18. Three of our editors attended this conference and sifted from the proceedings the kernels of new knowledge dropped by speakers at the many sessions. Had you attended the conference yourself you could not have picked up all these points, because more than one session was held simultaneously. See page 43. Many important topics are discussed, these pertaining to technology, engineering and materials.

Coming

THE LITTLE THINGS THAT COUNT

While food processors are becoming more and more conscious of the importance of preventing bacterial contamination of their products, too many are perhaps unaware of the extreme importance of guarding against this at every little step in their operations. This has been brought home in the crabmeat industry, because that product is more seriously affected by contamination than most foods. So useful information can be gleaned by food manufacturers in general from a future article on the sources of bacterial contamination of fresh crabmeat. The authors are C. S. McCleskey and Leonard Tobin, scientists at Louisiana State University.

MOLDING MEN FOR MANAGEMENT

Soon after its formation, General Foods Corp. came up against a need for more trained men to serve as junior executives. So it was decided to hire more graduate engineers and informally train them for positions in all units of the corporation. The men who received this training proved of exceptional value to the organization. Consequently, a formal student engineers' training course was established. How this training is carried out will be told in an early issue.

WHAT COLOR IS IT?

How green is a green bean? How yellow is butter? How orange is an orange? Correct answers to these and other food-color questions have a direct bearing on the color of the ink in a food processor's profit-and-loss statement. For the color factor in the selection of food by the consumer is significant. Unfortunately, the unaided eye cannot be trusted in color determinations. Practical help on the color problem will be contained in a coming article by Gordon W. McBride, chemical engineer.

THINKING VINEGAR GENERATOR

That is what they call the new Frings Automaton vinegar generator, because it operates by itself. It is an improvement over what in 1935 was considered the last word in controlling the bacterial oxidation of alcohol to acetic acid. The other one worked, but careless operators too often used their own ideas of operation, with bad results.

Now electromagnetically actuated valves control the rate of circulation of the mix, rate of flow of cooling water and rate of air circulation. Because of the trend to automatic control, there is something here for all the food industries. The author is Joe Lowy, who for eight years cooperated with H. Frings in Europe.

FOOD INDUSTRIES

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LAURENCE V. BURTON, Editor

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The Talk of the Industry

★ UNEXPECTED and annoying coincidences marked the last days of May and spoiled a lot of plans for publicity on behalf of better nutrition for the people of the United States. Picture some 700 delegates to the National Nutrition Conference for Defense eagerly scanning the Washington papers for headlines about their deliberations and seeing only the screaming headlines about the sinking of the Bismarck! Of course, the sinking of the Bismarck was quite unpremeditated by the members of the Conference or official Washington.

But the unexplained coincidence was the President's "Fireside Chat" of May 27. No one has yet been able to figure out why the President called the Conference on Nutrition to convene on May 26 and then usurped the front pages of the daily press with his talk and proclamation of an unlimited emergency right in the midst of the Conference.

★ SPEAKING OF PUBLICITY, a further query arises: Why broadcast on a national hook-up the speeches of those who admit that they know little or almost nothing about the science of nutrition and reserve the remarks of the real high-powered specialist for the smaller visible audience?

★ BEST wisecrack of the month was Paul V. McNutt's remark that what we needed in this country was vitamin Z—a something which gives zest and pleasure to the eating of foods that we ought to eat.

★ IT'S Doctor Colby M. Chester now, since Colgate University has conferred the degree Doctor of Laws upon the Chairman of General Foods Corp., and Doctor Christian R. Lindback since Bucknell conferred the same degree on the President of Abbotts Dairies.

Speaking of degrees, it is odd how they are acquired and then forgotten as their holders achieve greater national importance. Al. Smith, Herbert Hoover and F. D. Roosevelt, for example, are loaded down with degrees, titles and decorations.

★ YOUR ADVICE and counsel are wanted by the editors. In June and July issues of FOOD INDUSTRIES we have what is called in the publishing business a Special Theme Issue. The theme is the problems of control of vitamins in processed foods. As a rule, FOOD INDUSTRIES has studiously avoided publication of scientific articles where the primary interest in such articles is for the man in the laboratory. But this time the relation of the control laboratory to plant control is so close that it is impossible to divorce the two in any comprehensive discussion such as this.

Question: Do you like such laboratory discussions? Naturally we should expect all laboratory chemists to say "yes." But how about you chaps who are in the plant operating jobs? Do you find such discussions of interest or would you prefer them to be left out?

Your letters to the editor on this point will have a material bearing on future plans.

★ GASLESS SUNDAYS are, apparently, soon to be a reality along the Eastern Seaboard of the United States as a result of scarcity of oil tankers.

While such conservation of gasoline will not interfere with essential industries like the distribution of food, it will have a profound effect on where the food is consumed on week-ends.

Any one may hazard a guess that as humanity learns to use its legs and walk on Sundays, the consumption of foods will be slightly increased.

★ SOME of the cash customers have again been admonishing us to anonymously avoid discussion of anything "political" in our editorial pages. To all such protests, let it be replied that this would be a better land if everybody took a greater interest in politics—provided you know what politics means.

Politics is the art of government. In a democracy where the people have the final say-so, everybody should be continuously studying politics. The weakness of a democracy is, however, that most of the very persons who should take a greater interest in the art of

government are willing—nay eager—to delegate all the political thinking to others who, though, in some cases, not very heavy with intelligence or character, are smart enough to make a good living out of it.

That same easy evasion of personal responsibility for politics appears to stem from a much stricter code (for others). Thus, FOOD INDUSTRIES, by implication, should live shut up in an ivory tower far from the sordid turmoil of life, thinking great thoughts, and generally advancing the cause of intellect while strikes, bone-headed managements, false leaders, subversive elements, spies and traitors parade across the scene and prepare the way for destruction to come.

In a recent survey of what food manufacturers expect of food technologists, one of them exploded in these words: "We expect a food technologist to be able to confer with the sales department without acting as if he were descending from the high plane of science." One suspects that minds of the latter type are the sort that admonish us to keep out of "politics."

Let those who disagree with us come out in the open and debate the issues. Use your heavy artillery. Permit your name to be published accompanying your comment or your reasons why you think what you think.

If we are wrong, you will shut us up quickly enough.

Lesson From The Nutrition Conference

ELSEWHERE IN THIS issue of FOOD INDUSTRIES will be found a rather detailed report of the three-day National Nutrition Conference held in Washington on May 26, 27 and 28, and the text of the recommendations made to the President by the Conference.

Those who read these recommendations with care will notice a peculiar thing. While most of them have to do with matters of diet and nutrition, education, distribution and economics, few, if any, of these recommendations could have been seriously made had it not been for work carried out during the past few years by the food industries and men associated with these industries.

Discoveries having to do with foods, their composition, how to preserve their natural nutritive factors during processing, and how to enrich them with vitamins and minerals, are almost entirely the result of work carried out in the plants and laboratories of the food industries and the universities. Without these discoveries, the recommendations growing out of the Conference would have been merely wishful thinking.

Butter and/or Bullets

CONTINUITY OF FOOD SUPPLY of certain types is likely to be difficult to maintain next fall and winter. The public, and some important folks in the food industries, fail to realize the significance of buying for Britain and other special defense plans. It is especially easy to make such a mistake when it is said that "the British requirements will represent only 2 or 3 percent of the United States food bill."

Procurement of foods for shipment abroad will be concentrated on a relatively few commodities. Lard and other pork products, dairy products and dried eggs will probably bear the brunt of the burden. The depletion of supplies of cheese, dried milk, canned milk, dried eggs, bacon and smoked ham is already becoming significant. Other semi-perishable products, those requiring refrigeration, are less likely to be taken. It is difficult to deliver them in good order. But even they may suffer somewhat by changed policies originating in Washington.

A second factor must also be taken into account. It is the deliberate purpose of Washington to divert skilled workers of many kinds from certain industries into defense manufacture. This will deprive the food industries of equipment and facilities, and it may even deplete their staffs of skilled personnel. The results will reach all through the manufactured food business. Supplies of materials commonly purchased without difficulty may be hard to get and this situation will apply to many goods for which there still appears to be abundance.

Hors d'Oeuvres

★ A brewer and a fruit-juice canner were after the hand of the same young lady. To gain her favor, the brewer gave her beer and the canner nectar.—A tale of whoa.

★ *Another story:—Know what the jar of mayonnaise said to the refrigerator? "Close the door, I'm dressing."*

★ Still another yarn:—A reporter asked a cheese man how to pronounce the name "neufchatel," "Noo-shah-tell," the man answered. Cut the baby talk, said the scribe. "Noo-shah-tell," the man repeated. "Go-to-ell," the reporter replied.

★ *According to Hitler's official Nazi daily, Voelkischer Beobachter, more vitamin C, more health-giving minerals and more nourishing salts are contained in the daisy than in most domestic vegetables.—Enriched flower.*

★ There was a gunner in the RAF who had a remarkable record for bagging Nazi night fliers. They called him "Carrots" because he was constantly munching on that vitamin A food, and unwittingly improving his night vision. Maybe Britain's new secret night-plane detector has long green leaves and a tapered reddish-yellow root.

★ *The center of the crab fishing industry is at Crisfield, Md., which packs more crab meat than any other locality in the world. This puts the crab capital in the shadow of the Nation's Capital.—Merely a coincidence, of course.*

★ Once upon a time there hung in a woodshed in Finden, Scotland, a supply of haddock for drying. This shed caught fire and the fish became smoked. Some one took a bite, and it tasted like more. Thereupon was born Finden Haddock, since shortened to Finnan Haddie. And that's no fish story.

★ *Four Boston physicians recently reported that vitamin B_1 can be used us a preventative cure for alcoholic encephalopathy, a nervous disease resulting from too much liquor and too little food. Which makes B_1 a good hinge for a binge.*

★ There are 160 varieties of fish and shellfish available throughout the year—in case you're interested in vittle statistics.

★ *There is a 2½ year supply of pepper in this country. Something for everyone to sneeze at.*

★ The Navy just bought gobs of applesauce—$11,067 worth—from a canner. And they can get it from Congress for nothing.

★ *The air raid on Belfast, Ireland, almost destroyed the packing plant of J. & T. Sinclair & Co., Ltd., a wholly owned subsidiary of Kingan & Co., Indianapolis. Who says our inland manufacturers can't be hit by Nazi bombs?*

★ Belatedly there is much discussion about a predunked doughnut conceived last fall by a famous chef. Actually the idea is that of Joe Cook, the comedian. It's amazing what chefs and doughnuts will do for publicity.

★ *In 1903 one horse and wagon could have delivered the nation's entire output of pasteurized processed cheese. Today the output is more than 260,000,000 lb. annually. Some cheese, that industry.*

F.K.L.

Without being alarmists, or merely getting the jitters, we might as well face a few of these unpleasant facts now. Then the planning which is needed will be done a bit more deliberately and the results may be a bit less painful to food management and to the appearance of the balance sheets of our enterprises. There will not be enough materials and employees to supply "bullets *and* butter." We may have to learn to get along without many food materials. And it will not be a matter of price, it will be a question of actual unavailability.

Research Profits

"GENERAL FOODS puts a great deal of stress on research. Last year, 1940, was the first full year of operation of our new Central Research Laboratories. When the results of our 1940 research work alone are applied to production, it is believed they will pay not only the cost of the new laboratories but the operation cost of our research, as well, for years to come."—From a recent advertisement by General Foods.

To get results like that, you have to know what you want, and go after it.

Selling Food to Britain?

MANY A MANUFACTURER has been breaking his heart down in Washington because he has not been able to get a share of Britain's food purchases under the Lease-Lend Law. We are shipping food to Britain, but Britain is not buying it, as was explained to us by a representative of the British Government.

Britain notifies the United States of what food it wants. The U. S. buys the food through the Surplus Marketing Administration, delivers it to British ships, and pays for it out of the many billions appropriated under the Lease-Lend Law. Nothing has been sold to Britain, and in theory this has been a food loan which may some day be repaid in food—not dollars.

The food manufacturer who wants a cut of this business has a tough time getting it unless the British Ministry of Food has specified what that manufacturer has to offer. Nobody representing Britain in Washington has the power to decide what Britain wants. The order must originate in Britain and, of course, be what the British will eat.

To persuade Britain to order something unusual from SMA will require some sales efforts in Britain itself—something that is rather difficult to accomplish these days. And, after all, it is well to remember that Britain is not buying but borrowing. The U. S. is doing the buying to lend the stuff.

Manufacturing Problems In Britain

THOSE who want to know more about what goes on in industrial Britain during the current war than is given by newspapers and radio may gain a few clues by these excerpts from recent advertisements in *Food Manufacture:*

"In these days of paper economy . . . " a manufacturer of vegetable parchment.

"Release these 6 men for other Vital Work"—a manufacturer of electric industrial trucks.

"If you are amongst those who are examining the usable possibility of this production (evaporated milk), now that the Continental supply has gone . . . "—a manufacturer of filling machines.

". . . the many who will find in spray painting the solution to the urgent production problems of these times."—manufacturer of spray painting equipment.

"Shortage of timber of all kinds makes it VITAL for you to preserve your containers as long as possible. You may shortly be unable to buy any at all."—a maker of enamel linings to apply to interiors of tight oak cooperage.

"As temperatures rise . . . production falls. Adequate ventilation is the first essential to efficiency and health of your workers, but black-out restrictions seriously impair natural ventilation, particularly at night."—manufacturer of exhaust fans.

"We beg the indulgence of our friends in these difficult days and would assure them that every effort is being made to meet the situation. In the national interests, priority is exercised for Government orders. All other orders are being dealt with in strict rotation as received."—a manufacturer of food colors.

"Soap economy a national necessity. Save soap and you save shipping; release man power."—maker of liquid soap dispensers.

"The prices of Gelozone remain the same, and the manufacturers hope to keep them so."

"Great though the call is upon our output by Government Departments we are still able to supply a fair proportion of urgent civil requirements of steel office and works seating and steel storage equipment."

"Inspect the modern factories being erected here."

"The (store) counter is your shop window during black-outs."—manufacturers of glass containers.

"Demand is there all right! But . . . patience is necessary whether the matter be cake over which we have no icing, or circumstances over which we have no control, such as supplies of stainless steel for food processing equipment. There's a job to be done, so we thank you for your patience. We are doing everything we can to cut out delivery delays."—Builder of stainless steel equipment.

Miscellaneous Information

FROM South America and Canada come inquiries for U.S.A. sources of supply for products heretofore obtained from Europe. Among these products is one used by bakers as a dough or flour improver and identified as "Chefaro." Chefaro comes in two forms. Chefaro "G" consists of ammonium persulphate in a phosphate filler. Chefaro "D" is ammonium persulphate and an iodate or bromate oxiding agent in a phosphate filler.

Saccharine vs. Saccharin

IN RECENT food standards proceedings in Washington is an annoying phrase—"saccharine ingredients." From the way in which it is used it is evident that such things as sucrose, dextrose, corn sirup, corn sirup solids, honey and other sweeteners are meant. Also that saccharin is *not* meant. This latter compound is not a sugar, is not a carbohydrate, and is not a food. Its use is rarely permitted in the food industries although it is, of course, well known as a non-nutritive sweetening agent that is specifically prohibited in a great many states.

Inquiry at the offices of the Food and Drug Administration reveals that use of this phrase began during the fruit preserves hearing. At that time some of the representatives of the food industry were speaking of sugars (correctly) as including other sweetening agents than sucrose. The feeling officially was that this might result in misunderstanding or even misinterpretation. A collective term was therefore sought which would logically embrace all these sweetening agents without using the name of any one of them.

"Saccharine ingredients" was the result of this cogitation. True, it does not include the name of the common food sugars. But it certainly suggests a compound which the Administration does not wish to include in this classification. Incidentally, how many of us can recall without aid of the dictionary that the adjective "saccharine" is spelled with a final "e", whereas the noun "saccharin" (referring to anhydro-ortho-sulphamine-benzoic acid) is not?

A little further inquiry evolves an interesting comment as to the reason for

this choice. In preserves, it was argued that sugar serves as more than a *sweetening* agent—an argument with which one can agree. But by what process of reasoning comes the deduction that sugars must, therefore, be called *saccharine* ingredients?

Until it is illegal to do so, we prefer to refer in our pages to sucrose, dextrose, honey, etc., as "sweetening agents" or "sweeteners."

We hope the Food and Drug Administration doesn't mind!

Look to Your Fire Protection And Avoid Disaster

FOOD MANUFACTURING PLANTS, as well as plants directly in the munitions industries, are liable to the greatly increased hazards that come with defense activity. These hazards of accident, fire or explosion have little relation to sabotage. Rather, they stem mostly from two things: Pressure to produce at a high rate with equipment that is worn out or in need of repair, but cannot be replaced because of priorities, or other defense measures; and the presence in the plant of inexperienced workers, hired to replace those who are drafted or have moved to munitions plants.

Increased hazards of this nature cannot be avoided by the food manufacturer until conditions are more nearly normal again. But something can be done, at least in regard to fire hazards. Reference is made to the great strides that have been made in the last two years in improving factory fire-fighting equipment. Sprinkler systems, available for many years, have been improved. Fire extinguishing systems using fire-fighting mediums other than water have made great advances. Methods have been developed for carrying on manufacturing operations, where there is danger of fire or explosion, in entirely inert atmospheres. Central fire-fighting systems using CO_2 are now available and are highly successful. And what might be called "explosion-fighting" systems are now under test.

It will certainly pay any food manufacturer whose plant has a fire or explosion hazard to investigate modern fire-fighting means. It may help him to avoid such disasters as that which recently occurred in a stockyard and a food warehouse in Jersey City.

Obscure Sales Obstacles —The Reuse Container

PACKAGING IN REUSE CONTAINERS always has its benefits at the outset, but it also may have its problems if the peculiarities of the feminine mind are not well understood. Mrs. America finds its impossible to throw away reuse containers after she has acquired as many as she wants. Her sense of the fitness of things, her urge for thrift, will not permit her to consign surplus reuse containers to the ash heap. So she buys something else that will not outrage her sensibilities.

How this works out is illustrated by the recent experience of a dairy company, which started to sell cottage cheese in attractive glass tumblers. The sales drive went over very satisfactorily, then tapered off. Tumblers of another color were supplied and sales picked up, but later declined. Still another color gave a temporary spurt. Then came a real sales slump in the best consuming season.

Only after a consumer survey was made was the answer discovered: Women just won't throw glass tumblers away, and after the family needs are adequately taken care of, they buy other brands of cottage cheese.

The dairy then quickly changed to another type of container which had no reuse value. Women are willing to throw away a container of that sort.

Management must be ever alert to obscure sales obstacles such as this one encountered with reuse containers.

To Stabilize Supply

APPLE TREES of many commercial varieties have the bad "habit" of alternately bearing heavily and lightly, the heavy crop appearing in odd numbered years since 1932 in the eastern states.

Apparently it got started as a result of some late frosts that killed all the fruit buds or blossoms over a large geographic area. The economic effect of such regular cycles of plenty and scarcity is what might be imagined. The problem has been how to get apple bearing back on a uniform basis.

J. R. Magness and L. P. Batjer of the Bureau of Plant Industry appear to have solved it by spraying the trees when the blossoms were in the early pink stage of a big crop year. This spray, commonly called DNO (dinitroorthocyclohexylphenol), kills the blossoms and prevents a set of fruit. And if the trees are ordinary self-respecting apple trees, they put out a normal set of fruit in the following year.

Admittedly, horticultural practices are not normally within the scope of the food technologist, but the food processor whose raw materials come from perennials that fluctuate wildly in their bearing capacity has a real interest in the possibilities of such methods of control of his supplies.

Mistaken Ideas About Public Relations

AFTER ALL these years of talk and publicity about the subject of public relations—the complex relations of a business with the outside public—it is disquieting to discover how little business executives understand what it is all about. And it is disheartening to realize that many executives seem to believe that they can purchase the esteem of the public like one would buy a house or a suit of clothes.

If you are one who thinks that the good will of others can be bought or acquired by hiring a public relations man, or by instructing the head of a trade association to do a job for your firm, you have another think coming.

Your business can *earn* the good will of the public, your business can *deserve* it. But you cannot buy it any more than you can buy a good reputation.

If you want to spend money for better public relations, all that you can do is to hire someone to steer or advise you. But it is you and your associates, by your own acts and policies, that acquire the reputation—good, bad or indifferent. Your public relations man or counselor cannot do more than advise you about what to do or what not to do. Your firm cannot acquire a good relationship by proxy any more than your son can acquire a camping experience merely because you may have employed a camp counselor but kept the boy at home.

If you hire a guide when on a hunting or fishing trip, you take the trip yourself along with the guide and you do the hunting and fishing. Suppose some business man sent a fishing guide alone into the wilds of the North country to fish all by himself. Presumably the guide knew his stuff and took in a big catch. What would the business man have to talk about when his friends came in? He didn't fish. He didn't make the journey. He didn't do nothin' except pay the bill. And certainly he can't acquire a reputation as a fisherman by such an absurd procedure.

Fantastic? Of course. But no more fantastic than the belief that a business man needs only to hire a guide and then, presto!, a good reputation has been won. If you follow the guide —a guide who knows his stuff—in time your business will acquire the good reputation for which you seek. You, your associates and your own employees earn the reputation that is good by deserving it. There is no other way.

Fig. 1. This photograph is an indication of the way that etching affects the cement in the jointing compound between bricks in the floor of a dairy plant. This action leaves depressions between the bricks and causes them to wear or chip at the edges under traffic. The picture also shows deterioration of the surface of the bricks by mechanical wear and by the action of cleaning compounds and water. With a floor in this condition, sanitation is a problem.

Why Floors Fail in Food Plants

The causes are complex, but none the less definite. They are a combination of physical and chemical reactions to conditions in and about the factory.

By RICHARD KANEGSBERG, *Engineer, East Orange, N. J.*

LITTLE of real value towards the solution of one of the worst problems of the food industry—building and maintaining clean, wear-proof floors—is found in the literature of architecture and engineering. Whenever food plant managers get together, somehow the talk gets around to floor problems, and stays there, because the questions brought up in such discussions are so varied and so divergent in character that very few men have had the wide experience required to deal with them all. Many of these problems are at present not properly solved. It is the intention of this and future articles to take up these problems and to discuss them as physical and chemical studies, first showing the reasons for various kinds of floor failures, then suggesting methods of correcting conditions, and finally discussing the proper selection of floors for many uses. It is naturally not enough to show a man that he has trouble—he already knows that, and probably has gray hair over it. What he wants to know is why, what he can do to fix it, and how not to make the same mistake the next time. Let us try to understand floors as engineering structures, subject to physical laws and under attack by numerous chemical and physical forces. In this light the properties of floor materials will prove to be all-important, and the chemical composition of a cure-all flooring compound will be examined before its maker's claims are accepted.

Two General Causes

The causes of floor trouble fall into one or both of two general classifications, physical and chemical. The physical, or structural, causes are usually solved by correctly applying engineering principles. The chemical causes, being more complex and usually more obscure, are not so easily solved, but respond in most part to careful study and analysis. This does not mean that structural and chemical engineers always must be called in to check floor troubles. But it does mean that in the particular instance of food plant construction, reliance upon the advice of a mason contractor or similar nontechnical help is an invitation to trouble and expense. The problems can be solved, inexpensively as a rule, only by carefully considering every aspect. And this can only be done by making the most careful study and analysis of every factor affecting the floor, including the cost of maintenance.

Let us first try to picture the physical structure of a floor. We have a founda-

tion, a floor body and a wearing surface. Each of these is subject to different kinds of physical attack. The foundation, through settlement, may endanger the entire building structure. The floor structure, through improper design, may flex or vibrate unduly. The wearing surface may be friable, brittle and may break up under the pounding of wheels or the destructive effect of water. Each of these is bad enough, but where there are combinations of such weaknesses the maintenance bill starts to mount. These weaknesses always get worse.

To start at the bottom, foundations are at the root of a great deal of trouble, particularly when a plant has moved into an existing building constructed originally for some different purpose. The concentrated loads of tanks, machinery and heavy equipment impose unbalanced loadings on footings which force uneven settlement of the foundation structure. The evidence of this settlement shows up in the cracking of walls and poor drainage of hitherto well-pitched floors. Care should be taken during the design of new buildings to take into account the special loads imposed by heavy equipment and the varying loads of emptied and filled tanks. Too often when an existing building is being studied the foundations are not analyzed from this standpoint. Other weaknesses are due to the soil supporting the foundations, seasonal variations in the ground-water level and the effect of frost. There is even the matter of local vibration in the soil to be considered. Such a condition might be caused by the nearby presence of a forge, railroad or powerhouse. No foundation for a food plant should be considered acceptable until all such factors have been checked and their general effect considered. The danger is acute not only to floor structures but also to expensive glass, ceramic ware, piping and processing machinery.

The effects of foundation settlement or distortion may be easily recognized by characteristic cracks. Such cracks appear above door openings, usually starting at one corner of a door opening and running upwards at an angle, indicating warping of a wall. Another type of crack appears at the joint between the wall and the floor and indicates by width and direction of movement the displacement which has taken place. Still another form of crack sometimes appears across the surface of floors which have warped from uneven settlement.

In certain locations, usually above filled-in areas or former swampy ground and during the spring of the year, there will be local and spotty settlements of foundation structures due to subsurface water. At this time of year, after frost leaves the ground, the water level rises and sometimes the soil becomes semi-plastic and the load-bearing value decreases. Under such conditions, by no means uncommon, there will be cracking. The careful plant manager, on the lookout for such symptoms, may find in such seasonal disturbances the answer to some of his troubles.

Of course, water is an enemy of all structures, and the appearance of damp-

Fig. 2. Close-up of section of floor in Fig. 1, but a different part of the floor. This part is under conveyors carrying full and empty milk bottles. The floor is subject to deterioration by hot and cold water, as well as strong cleaning solutions and some (not much) spilled milk. Between the bricks the cement binder has been washed away, and the surface of the bricks has become porous.

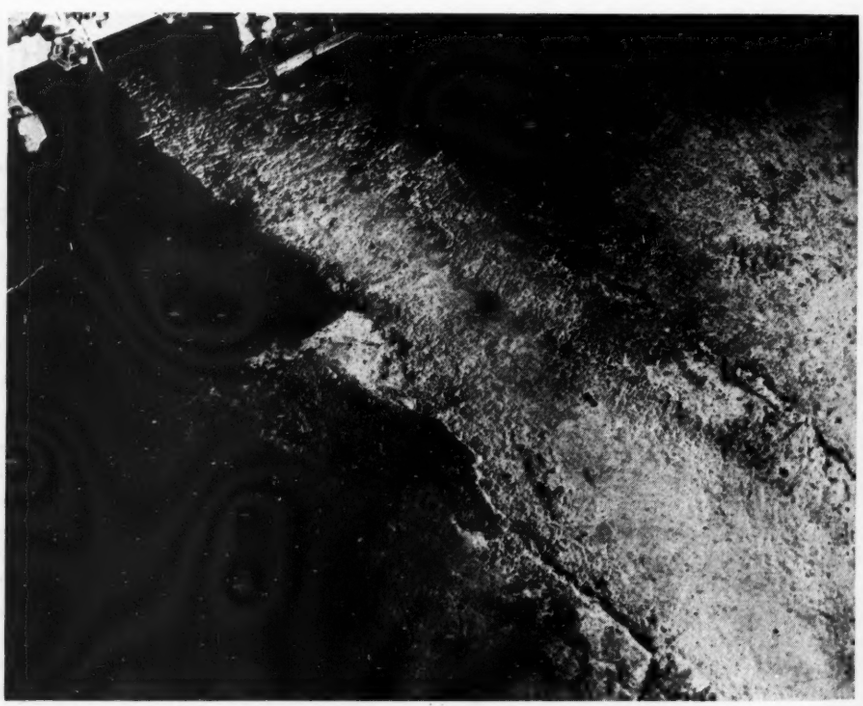


Fig. 3. What can happen to a concrete floor in a dairy plant, where spilled milk, hot water, wear and cleaning solutions affect the floors. The picture shows a gutter cut into the concrete by milk and water flowing from a storage tank to a drain. The concrete is etched to a depth of ¾ in.

Fig. 4. Gutter over an inch deep cut into concrete floor by erosion of milk and water in a dairy plant. The lactic acid attacks the cement, freeing the aggregate, which washes away. Concrete floors eroded and made porous by this action are impossible to clean and difficult to truck over. Such floors cannot be repaired, and a new floor is necessary to correct the trouble.

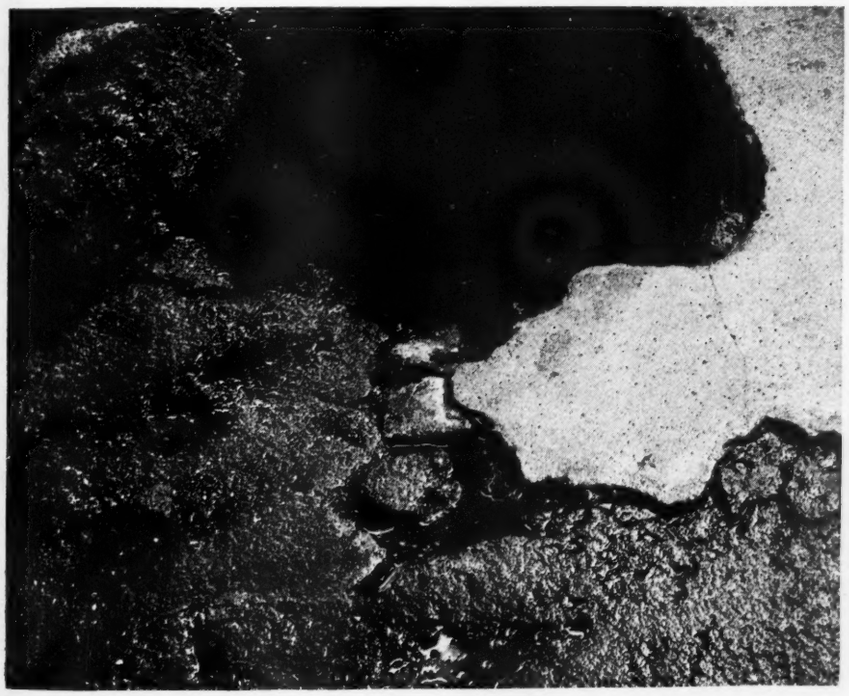


Fig. 5. Two types of flooring were tried in this plant where sugar sirup and washing-down daily with hot water and steam are the destructive agents. The dark flooring is cold mastic (a compound of asphalt emulsion, sand and Portland cement). The light flooring is concrete, laid for experiment about a year ago.

ness or wet spots at points where dry conditions have been the rule is usually an indication that there is failure somewhere and that continued damage may be averted only by quick action. Water indicates cracking, weakness and disintegration, all elements of danger.

Vibration transmitted through the soil has been traced for great distances to such sources as an unbalanced flywheel. Such vibration, sometimes obscure in origin, has been known to be the source of serious foundation trouble, all the more serious because of the difficulty of eliminating the cause.

When we come to consider the floor itself as a structure, we also find that the large number of types of floors makes for that many more chances for failure. Only too often we find heavy vibrating machinery placed on a floor structure which by its very design must flex and sway with the machine motion. Yet the plant manager must contrive some method of making such a floor permanently watertight. Here again we find floor structures designed for one usage put to another use with poor results or failure.

Cost is a great element in the consideration of this item, but the cost of a new floor must be balanced against the possible costs of operating with an unsuitable floor. Many a plant manager will find the source of his trouble under the surface of the floor in the very body of the floor structure. Here too we find the considerations of material and quality coming into the picture. Cinder concrete cannot substitute for stone or gravel concrete, steel reinforcing cannot be eliminated without due cause, timbers and beams cannot be skimped without in some measure losing elements of safety and long life. These are elementary considerations, yet so often the desire for minor savings in construction costs is the eventual reason for the destruction or failure of important floor surfaces. Temperature stresses are an additional element of failure and contribute no small share of trouble.

Any floor of rigid, unyielding construction subjected to wide variations of temperature is a potential source of difficulty. There must be provision for expansion and contraction in such floor structures or the stresses set up will cause cracks and eventual breaks. Cracking from temperature stress may sometimes be identified by indications of crushing at the edges of the cracks.

Floor surfaces in the food industry must take their full share of abuse and wear with the added handicap that they must usually be maintained scrupulously clean. Under the circumstances it is no wonder that in this service we find such a large proportion of floor failures. Physically, the floor surface must withstand foot and wheel traffic, impact, cutting action, water erosion, steam and the usual harsh abrasive cleaners. In addition to these forces, the floors are subjected to chemical attack from pickle, brine, acids, alkalis, sugars, milk, fats and oils, as well as the varied products of fermentation, bacterial decomposition and microorganic

Fig. 6. This badly damaged concrete floor is less than two years old. It has been subject to fruit acids and sugar sirup, to a considerable amount of hot and cold water and to some traffic. This is typical of the way fruit acids and sugar destroy cement, leaving sand and stones. The plant in which the picture was taken makes candied fruits and fruit sirups. Pieces of fruit are seen on the floor.

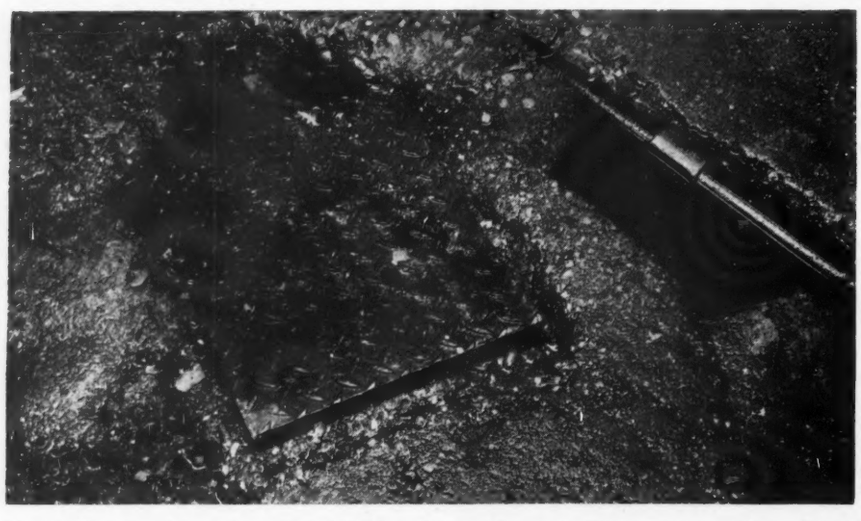


Fig. 7. Close-up of section around drain of floor shown in Fig. 6. The action of fruit acids and water is most destructive at the drains because of the concentration at that point.

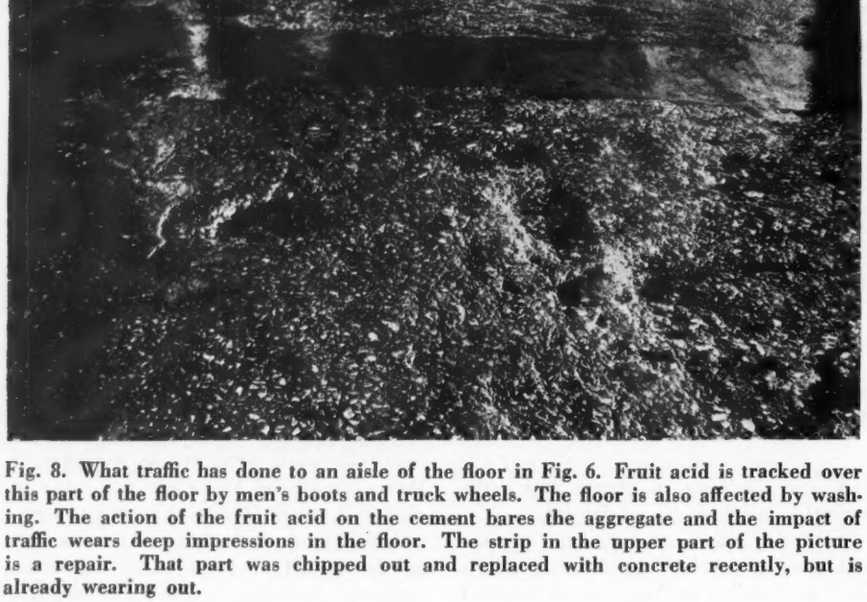


Fig. 8. What traffic has done to an aisle of the floor in Fig. 6. Fruit acid is tracked over this part of the floor by men's boots and truck wheels. The floor is also affected by washing. The action of the fruit acid on the cement bares the aggregate and the impact of traffic wears deep impressions in the floor. The strip in the upper part of the picture is a repair. That part was chipped out and replaced with concrete recently, but is already wearing out.

growth. Add to this list the far from mild attack of cleaning compounds and we begin to comprehend the size of the problem. Every one of these attacking agents must be considered alone and as an element in combination with others before a decision is reached as to the cause of troubles. The evidences of attack are numerous. They appear in eroded surfaces, cracks, heaved floors, odors, discoloration and disintegration.

The nutritive value of most solutions affecting food plant floors makes most of them excellent breeding grounds for bacterial growth unless special precautions are taken to insure prompt removal of the solutions. In practically all cases there is a certain amount of solution absorbed by the floor surface, and bacterial growth continues practically unchecked in the pores and crevices of the floor. Fermentation takes place there and the acid products of bacterial decomposition carry on disintegration of the floor surface.

Milk, fruit acids and sugars are prime offenders in this class, the products of their fermentation being acids which attack a great many floor materials. There is a progressive disintegration in such floors until a point is reached where it is no longer possible to maintain a clean or usable floor surface. Boiling water, steam, antiseptic washes and caustics are used to neutralize the effects of this action, but here the cure is almost as bad as the disease. Temperature stresses from hot liquids start minute cracks in masonry structures, chlorine and caustic washes attack numerous floorings, and the effect of the absorption of alkali salts is very destructive.

Some of the effects of chemical attack are intensified by traffic conditions. Rolling barrels, sharp-edged wheels, dropped cans and containers all impose added strains on the floor surface and sometimes open up avenues of attack.

The eroding effect of plain water is insidious, but none the less very effective in advancing corrosion attack. Aggregates of a floor partly weakened by intermittent acid attack will frequently be found to be washed out by subsequent plain water wash. Carelessness and cheating in the mixing of concrete causes no end of floor damage through dusting and is frequently shown up by the breaking of thin surface layers. The fault finds its origin in too wet a concrete mix or improper working of the wearing surface. The surface of the floor is characteristically soft and commonly is underlaid by a body of hard dense concrete. Unfortunately the surface must take the beating of traffic so that the soft surface quickly disappears and the rough undersurface is left exposed.

Mycostatic* Salts Prevent Mold Growths on Stored Foods

Permit storage of perishables at relative humidities sufficiently high to avoid shrinkage or discoloration through loss of moisture

By W. L. MALLMAN, *Professor of Sanitary Bacteriology, Michigan Agricultural Experiment Station, East Lansing, Mich.*

HOW to store perishables at refrigerated temperatures for long periods without loss in quality or market value is a problem which troubles many food processors and distributors.

Recently published results of studies by Mallman and Michael[1] suggest a solution to that problem through the use of chemical salts with specific and unusual properties. These salts are mycostatic (inhibiting to mold growth) in their action. In addition, they have relatively high vapor pressures. And, for good measure, the emanating vapors themselves have mycostatic properties.

Their use does not involve application of the salts or their solutions to the perishables directly. Instead, the application may be made to the containers or packaging materials surrounding the perishables to prevent the growth of mold on these materials. Vapors given off by the treated containers or packaging materials in turn prevent or retard the growth of mold on spore-bearing perishables.

The peculiarity or uncontrollability of refrigerated storage conditions makes necessary special procedures for the repression and avoidance of mold. Even though relatively low temperatures are used, mold growths on perishables are almost certain under storage conditions. An essential for mold growth is the presence of sufficient moisture to germinate the spores and to start the mycelial (vegetative) growth. Such a condition exists when the humidity of a storage room is sufficient to form a film of moisture, even microscopic in thickness, on the surfaces of foods and their containers. The molds grow slowly but surely. Yet, when the humidity is controlled to prevent the formation of the moisture film and growth of molds, the foods lose moisture to the air. Shrinkage, "freezer burn," and loss of food quality result. In either instance there is monetary loss to the owner and a flavor or eating quality loss to the food consumer.

In operation, cold-storage-plant humidities are held at a point just below the dew point for the specific temperature required, when accurate control can be maintained. But often there are factors in operating conditions which are uncontrollable, with resulting losses in foods occasioned by mold growths as well as by loss of moisture. Shell eggs are a case in point.

Millions of 30-doz. cases of eggs are stored annually at temperatures ranging from 29 to 31 deg. F. At these temperatures eggs can be stored for periods of three to six months with varying success.

Low Humidity Detrimental

When the relative humidity of the storage room is consistently maintained at 85 percent for these temperatures, decomposition of the eggs by bacteria and molds is kept to a minimum level. A variation in the relative humidity to less than 85 percent causes the eggs to lose moisture, develop large air sacs inside the shells and depreciate in market value. A variation in the relative humidity to higher percentages stops loss of egg weight through evaporation, but the resulting film of moisture on the egg shell causes molds and bacteria to grow.

These organisms eventually penetrate the shell, and the egg spoils. Even though the mold does not penetrate the shell, undesirable mold spots form on the shell with resulting loss in market value of the egg.

Because of these losses resulting from humidity variations and because present cold-storage-plant operations do not make rigid humidity control certain, American Institute of Poultry Industries sponsored a series of studies on egg-storage problems. The studies were to determine ways and means of mold control to the end that eggs might be stored at relative humidities higher than 85 percent without danger of spoilage and, if possible, with improved retention of fresh-egg qualities.

The first approach was to determine what molds are involved, where their growth is greatest, and what their source is as far as egg spoilage is concerned. To those ends, fresh and moldy eggs were examined, as were new and moldy fillers and new and moldy flats and cases.

Types of Mold Found

On moldy egg surfaces were found 214 strains of penicillia, 50 strains of aspergilli, and 80 strains of mucors. Spores of the same types of molds were found on fresh and high-quality storage eggs but in greatly reduced numbers. Out of 170 isolations made from the inside of moldy eggs, 66 were identified as penicillia (green molds).

Isolations made from new and moldy fillers, flats and cases revealed the same types of molds found on moldy eggs, with the penicillia predominant and the only type which penetrated the egg shell to produce moldy egg meats.

Isolations made from fillers, flats and cases revealed that only a few spores, penicillia in type, were to be found on new fillers and flats and that new cottonwood and gumwood cases had large numbers of spores, none of the penicillia type. In the light of these facts, new fillers, flats and cases were eliminated as sources of mold contamination of eggs.

Used fillers, flats and cases told a much different story and gave proof that when eggs are packed for a lengthy storage period old or used packing materials should not be used. They carry a heavy inoculation of molds, particularly the penicillia, and will give a heavy seeding of mold spores upon whatever they contact. They themselves will become heavily overgrown with molds under high-humidity conditions. However, it must be recognized that these used packing

* Inhibitory to mold spore or mycelial (vegetative) growth.

[1] Technical *Bull.* 174, The Development of Mold on Cold Storage Eggs and Methods of Control, by W. L. Mallman and Catherine Edwards Michael, Bacteriology Section, Michigan State College, East Lansing, Mich.

materials became contaminated during the first use period and that they merely serve as a carrier of mold spores from the first source of contamination.

Inasmuch as fresh and high-quality storage eggs carry an appreciable number of mold spores, mostly penicillia, they were suspected as the source of trouble in mold contamination of fillers, flats and cases as well as in their own mold spoilage.

To determine that point, clean eggs were stored in new containers at 31 deg. F. under relative humidities of 90 to 95 percent. In three months a heavy growth of mold resulted, and the eggs became unfit for market. Eggs for these studies were carefully selected so as to be as free as possible from an abnormal number of mold spores on their shells. Also, the results of this study showed that freedom of the storage room from molds, or elimination of air-borne mold spores, plays a minor role as far as source of mold contamination of eggs is concerned.

Sanitation of packing areas and storage rooms does play an effective part in keeping mold contamination under control and should be observed in preparing the cold-storage rooms for use each year. But, there is plenty of convincing evidence that the molds which cause trouble are brought into the packing and storage rooms on the eggs themselves. Also there is plenty of evidence that there are sufficient numbers and kinds of molds on each egg to cause all the trouble that may occur.

How Mold Spoilage Can Be Controlled

With these facts determined, the study resolved itself into determining how mold spoilage of eggs could be controlled. Washing the eggs in a fungicidal solution is not expedient because such treatment gives rise to other kinds of egg-quality deterioration.

Control by terminal disinfection such as is customary in most cold-storage plants at the end of the season is a commendable practice. It assures a clean room free from a carryover of contaminating molds and bacteria, particularly when the walls and floors are given a thorough washing with disinfecting solutions such as those containing sodium hypochlorite, sodium orthophenyl phenate, formaldehyde and other proved chemical agents. While terminal disinfection helps, it does not destroy the contaminating organisms brought in on the eggs or their containers. It merely assures that the eggs are coming into reasonably sterile surroundings.

Control by concurrent disinfection through continuous action of a chemical or physical agent during the storage period has a more lasting effect. It may be accomplished in several ways. Under some conditions, at least, the use of 2.5 to 10 percent of CO_2 in gas-tight storage rooms has been reported as preventing mold spoilage of eggs at a cost in keeping with present-day storage rates. Introduction of small amounts of ozone into the circulating air results in suppressed mold development if sufficient concentrations are maintained. The effectiveness of the two gas methods in the presence of 90 percent and higher relative humidity is problematic and worthy of critical study.

Chemical Agents Effective

Introduction of a chemical agent into packing materials is a method of concurrent disinfection which has proved conclusively effective for eggs stored for three to six months in the presence of 88 to 90 percent relative humidity at 32 deg. F. Humidities of 90 to 100 percent were also used for experimental purposes only. Chemical agents impregnated into the fillers and flats not only protected these materials themselves from mold growths but also projected their disinfecting properties into the cubicles containing the eggs, and in that way protected the eggs against development of molds on their own surfaces.

Studies to determine the effectiveness of these concurrent disinfecting chemical agents were made possible through the cooperative assistance of the Central Fibre Products Co., manufacturers of egg filters; the Mapes Co., makers of egg flats; Dow Chemical Co., producers of the chemical agents used; and U. S. Cold Storage Co., which provided special storage facilities and conditions.

Among the first chemical agents studied were boric acid, sodium borate, sodium benzoate and copper salts. These salts protected the treated fillers and flats themselves, but gave no protection to the eggs during storage at high humidities. In fact, the eggs became as moldy as though untreated fillers and flats had been used. When the eggs were dipped into solutions of these chemical agents, no mold growths developed on either the eggs or packing materials. Although the dipping method was effective, it is commercially impracticable.

A second group of chemical agents was selected from compounds having relatively high vapor pressures. Not only do these compounds themselves have mycostatic (mold inhibiting) properties, but the vapors also possess those properties. During the tests, eggs carrying mold spores were positioned so as to be in contact with the vapors of the chemical agents without coming in contact with the agents themselves or with any objects covered or impregnated with the agents.

Of the several agents tested only two gave encouragingly satisfactory results.

Chemically identified as sodium 2, 4, 5-trichlorophenate and sodium pentachlorophenate, these fungicides are commercially known as "Dowicide B" and "Dowicide G", respectively. The trichlorophenate gave positive results in low concentrations because it vaporizes readily. The pentachlorophenate gave equally positive results when increased concentrations were used.

In view of the pentachlorophenate's greater stability in comparison with the trichlorophenate, its mycostatic properties are considered to be more durable and continuous in action than those of the trichlorophenate over a long storage period. Also, its stability makes the cost of the treatment considerably less expensive.

In a test comparable with commercial practice at 90 percent relative humidity and 31 deg. F., eggs were stored in fillers and flats containing the sodium pentachlorophenate in concentrations varying from 0.2 to 0.8 percent. An equal number of eggs was also stored as controls in untreated fillers and flats. Strawboard, "Nu-process" strawboard and newsboard fillers were used in all tests. The eggs were stored in commercial refrigerated warehouses in various parts of the United States.

When the eggs were examined after a six-month storage period, no penicillia (green mold) were found on them. Although white fuzz molds were found on eggs in both treated and untreated containers, there were far less of these growths on the eggs in treated containers. "Leakers" in the treated fillers and flats had only slight mold growth which was confined to the actual egg matter. Eggs in adjacent cubicles were unaffected. In the untreated fillers and flats, the mold growths frequently extended to eggs in the adjacent cubicles and, in some instances, to eggs directly below in the next layer.

Taste Test Conducted

As a check on flavor and eating qualities of the eggs under test, those from both treated and untreated fillers and flats were submitted to expert judges. No undesirable flavors or odors were detected in the eggs stored in the treated fillers and flats. In the course of elimination tests, eggs stored in fillers and flats containing approximately 0.4 percent sodium pentachlorophenate were found to be sufficiently protected by mycostatic vapors to prevent mold growth. When lower concentrations were used, the eggs developed mild mold growths even though

(*Turn to page* 54)

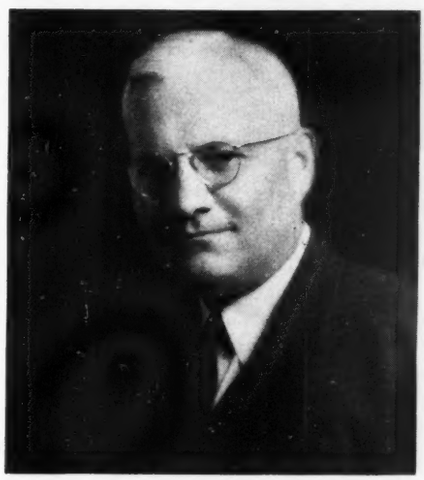
Food Technologists Analyze Problems and Progress

Discuss vitamins, technology and engineering, packaging and storage, by-products, education, national defense, sanitation and flavor at IFT Conference

MORE than 450 of the country's outstanding food technologists and food manufacturers enjoyed a varied program of technical papers, plant inspections and entertainment in Pittsburgh on June 16, 17 and 18 on the occasion of the second annual meeting of the Institute of Food Technologists.

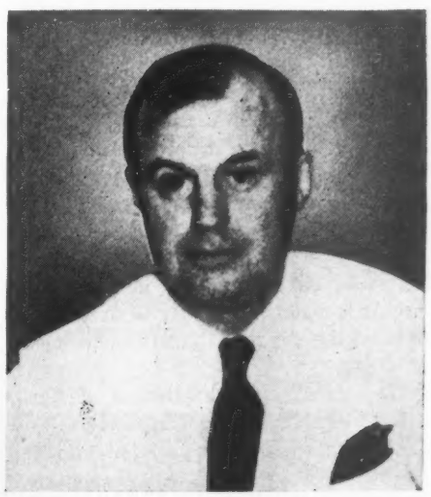
Reporting at the opening session on the growth of the institute, President S. C. Prescott in his keynote address stated that in less than two years of existence over 1,000 members, associates and affiliates have joined. This growth has been steady and continues, giving promise that, before long, all the outstanding food technologists of the country will be included.

Vitamin restoration and fortification was the subject of the first technical session of the meeting, addressed by Russell M. Wilder of Mayo Clinic, Rochester, Minn., G. R. Cowgill of Yale University and J. A. Tobey of American Institute of Baking under the chairmanship of Walter H. Eddy. In opening the meeting, Mr. Eddy pointed out that the chief responsibility of the food manufacturer, after the nutritionists have decided what foods are needed, is to make stable products and to merchandise them. Mr. Wilder laid particular stress upon recent research and experimentation that indicate the close relation between vitamin B_1 intake and morale, recounting tests that show that worry, instability, inattentiveness and liability to accidents follow upon insufficiency of B_1 in the diet.



L. V. Burton, editor of "Food Industries," was elected president of the IFT at the conference in Pittsburgh.

E. H. Harvey, who recently became director of research for Anheuser-Busch, was elected vice-president of the IFT.



G. J. Hucker, New York State Agricultural Experiment Station, Geneva, was reelected secretary-treasurer of the IFT.

The brains back of the Institute of Food Technologists, members of the IFT council, assembled at the Sunday meeting preceding the sessions at the Hotel William Penn. The three men seated are S. C. Prescott, G. J. Hucker and Roy C. Newton.

Mr. Cowgill's paper made a plea for definite determination as to the necessity for vitamin addition to foods, stating that such investigation should be along four lines: (1) Examination of statistics; (2) analysis of characteristic diets of the various groups of the population; (3) gathering of all available clinical data; (4) consideration of the testimony of home economists.

Mr. Tobey's talk brought out some pertinent facts concerning the fortification of bread with vitamin B_1, showing that bread on the average now supplies about 25 percent of the calories in the

Early birds at the conference line up at the registration desk on Sunday. The earliest of them all was the handsome gentleman looking on from behind, Stroud Jordan.

Some technologists wives went to the conference. Mrs. R. A. Pouchain (left) and Mrs. H. N. Riley in the company of Mr. Pouchain (left), Mr. Riley and J. A. Dunn.

It was a busy and tiring day for these technologists, A. W. (Colonel) Harvey (left), Earl C. Palmer and Bernard Gilmore.

diet and also supplies about 25 percent of the needed quantity of B_1. He also pointed out, in connection with the now-famous remark that "one-third of the population is undernourished," that this may be an exaggeration as it was based upon a study of but 4,000 hand-picked diets over a week's duration.

Food Technology Session

A general session on food technology, under the chairmanship of L. W. Bass, brought out several papers that reported the progress of research projects. E. C. Ritchell, E. L. Piret and C. A. Mann told of the development at the University of Minnesota of a large-scale laboratory apparatus for controlled dehydration of foods. This apparatus, which cost not much over $400 to install, permits close control of air temperature, humidity and circulation and has so far been used in tests on the drying of gelatine and meat products.

H. J. Loeffler, of the Bureau of Agricultural Chemistry and Engineering, Los Angeles, reported on researches into the maintenance of cloud in citrus juices, stating that color and appearance of these juices depend upon the maintenance of this cloud. If untreated, the cloud soon disappears because of the action of peptic enzymes. Prompt high-temperature pasteurization (92–94 deg. C.), followed by prompt cooling to 70 deg. C, and prompt filling, protects the cloud, although it slowly decreases even after this treatment.

George F. Stewart and Ralph W. Kline of Iowa Agricultural Experiment Station, Ames, reported on the first part of an investigation of dried albumen, dealing with lessening of solubility and change of color during storing. This research indicated that these defects occur in egg albumen dried without previous fermentation, but that when complete fermentation is carried out, these qualities of color and solubility are stable. Dextrose is the factor causing the trouble, and fermentation destroys the dextrose.

In a session on waste and byproduct utilization under the chairmanship of H. E. Barnard of National Farm Chemurgic Council, F. W. Mohlman of the Chicago Sanitary District stressed the serious load placed upon sewage disposal plants by the wastes from food manufacturing plants. The paper brought out the fact that much of value is discarded in these so-called wastes. While often these materials, if recovered as byproducts, do not justify the operation on the basis of direct dollar return, the return that is realized, added to lessening of the burden on the sewage treating system, fully justified the expense.

Food and Defense

The part of the food industry in the national defense effort was considered in a session under the chairmanship of Col. Paul E. Howe, of the Medical Corps. In this session, Lt. Col. R. A. Iskar, Q.M.C., after discussing the various rations developed by the Army to meet the needs of the soldier in camp and field, or on special services, outlined the various methods of testing food containers used by the Army. Both packaging materials and the containers made from them are tested in the laboratory under all sorts of varied conditions. But principal reliance is placed on use and transit tests. In the use tests, the filled containers are put through an accelerated series of field trials, and subjected to rough treatment and exposure more severe than are likely to be met with in actual service. In the transit tests, the packages are shipped to the Philippines and to Alaska.

R. S. McBride of FOOD INDUSTRIES discussed ways for offsetting possible shortages of packaging materials, pointing out that there well may be shortages of all materials. Tin, all other metals used in packages, plastics, enamels, rubber and some other materials are already on the priorities list. All other packaging materials may give trouble, in some cases due to shortages of equipment, in other cases due to shortages of other materials used in manufacture, as for instance, the chlorine used in bleaching. These troubles will not come this year but some of them will inevitably come in 1942. Therefore, the food manufacturer should study his packaging materials and equipment now and prepare for the shifts and changes that must come.

In conspiracy to make the conference a big success are Mary E. Aiken, E. K. Wallace and A. J. Claxton, on one of the local arrangements committees.

Vitamins and enrichment get a going over in this get-together between Charles N. Frey (left) and Russell M. Wilder, authorities on vitamins and nutrition.

The cameraman interrupted a group discussion to get a picture of Lee Nutting (left), Joe W. Graf, Alder Fonyo, J. A. Dunn and Oscar Spiegelhalder.

At a luncheon meeting on the educational aspects of food technology, the universities' viewpoint was set forth by W. V. Cruess of the University of California and the manufacturers' view was presented by L. V. Burton of FOOD INDUSTRIES, resulting in the appointment of a committee of the Institute to study curricula.

In a divisional meeting on the bacteriology of sanitation, under the chairmanship of E. J. Cameron, National Canners Association, papers were read by L. B. Jensen, Swift & Co., M. E. Parker, Beatrice Creamery Co., P. S. Prickett, Mead, Johnson & Co., H. E. Goresline, U.S.D.A., and E. H. Parfitt, Evaporated Milk Association. The paper by Mr. Jensen dealt with bacteria control in moist products, particularly meats. Prompt cooling with humidity control and preferably quick freezing, followed by maintenance at a low temperature, is the best way to reduce microbial activity. Mr. Prickett set forth six principles of bacteria control in dry products, as follows: (1) Include micro-biological specifications in standard requirements; (2) if necessary, sterilize raw materials (as spices); (3) protect against infection from external sources; (4) employ only clean and well-trained personnel, in a working environment that promotes bacteriological cleanliness and good housekeeping; (5) keep the product clean; (6) pack in suitable moisture-proof and insect-proof containers.

The paper by Mr. Parker pointed out that final quality evaluation rests with the consumer and is based on price, eye appeal, taste and healthfulness. Therefore, he felt that qualitative tests for such products as milk and juices were more useful in the long run than quantitative tests (bacteria counts).

Papers by Messrs. Goresline and Parfitt dealt with plant sanitation and the relation of engineering design to sanitary control. Combined, these papers indicated clearly that bacterial control and sanitation in the plant cannot be carried out unless backed by good engineering. Production of clean steam, removal of condensate or other moisture, correct plant layout and equipment design, condition of exposed surface and the effect of cleaning on the polish of equipment were among the engineering aspects of the matter that were stressed.

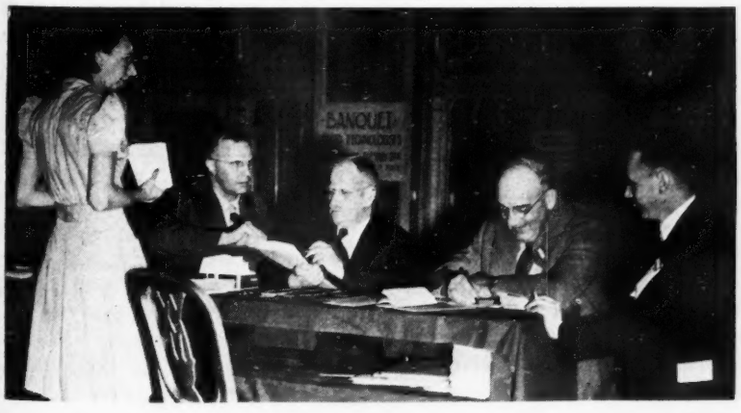
In a technical session of the meeting on process engineering in food manufacture, there were papers by Robert Dillman, Libby, McNeill & Libby; R. I. Tenney, Wahl-Henius Institute; A. P. Lee, consulting engineer; E. M. James, Lever Bros. Co.; and C. M. Merrill, National Canners Association.

Defines Food Engineer

Mr. Dillman defined a food engineer as a practical scientist who must primarily understand foods and the various aspects of the problem of food preparation. He does not need to be a trained bacteriologist or food chemist, but must be able to analyze and evaluate a bacteriological report on the findings of a chemist. He should know as fully as possible the effects of processing upon the vitamin, mineral and nutritive values of foods, as well as about vitamins, minerals and nutrition. Also, he must be acquainted with the basic principles of such engineering factors as heat transfer and materials handling, as well as sanitation, plant housekeeping and report making. Direction of work to be done in a rather detailed manner with the aid of chemists, bacteriologists, physicists and other scientists, is usually the role of the food engineer.

Mr. Tenney, in discussing the merits of continuous or batch operating procedures, gave each a functional place in the planning of a process application.

(*Turn to page* 101)



Action picture of a problem being straightened out by members of one of the local arrangements committees and officers of the IFT. Left to right are G. J. Hucker, S. C. Prescott, Fred C. Blanck and L. W. Bass.

Three members of IFT enjoying one of their lighter moments at the conference. They are (left to right) Lee Nutting, Sam Gorseline and Fred Tanner.

Poultry Smoking Tests Indicate Successful Methods

Care in handling, freedom from contamination by microorganisms, and control of pickling and smoking conditions are factors in production of salable product

By MATTHEW E. HIGHLANDS, *Department of Bacteriology and Biochemistry, University of Maine, Orono, Me., and* JOHN W. BURNS, *Union, Me.*

SMOKED poultry, a specialty food product, has aroused much interest within the past few years in this country. Because of this interest on the part of potential producers, the writers undertook an investigation of some problems associated with its production.

In our opinion this product would have a limited market since it must be sold at a relatively high retail price. Furthermore, its market is limited in part to delicatessens, hotels and specialty food product retail outlets.

One advantage to the large scale poultry producer lies in the opportunity of converting his cockerels into a product which will bring a good financial return.

Killing and Drawing Operations

Birds for production of smoked poultry should be killed by piercing the brain and bleeding, followed by any method of picking which will cause a minimum of injury to the skin surface of the bird. In drawing, great care should be taken to avoid rupturing the intestines and subsequent contamination of the body cavity with the intestinal contents. The deposition of large numbers of microorganisms in the body cavity, which may later cause off flavors and difficulty in the pickling process, is thus prevented.

Following evisceration, it is well to wipe out the body cavity with a paper towel. This tends to absorb any leakage or excess moisture which may remain. A better cure in the pickle as well as a more thorough smoke is obtained if the bird is split down the back before immersing it in the pickle. From a sales standpoint the halved bird is an added advantage, since if it seems desirable to sell either a whole or a half bird, the quantity in each part can be controlled.

Pickling Operations and Formulas

As a starting point in the pickling process, the formula suggested in a leaflet put out by the United States Department of Agriculture was used. This formula follows:

Formula 1

Salt	6 lb.
Sugar	3 lb.
Saltpeter	3 oz.
Water	4½ gal.

Poultry treated with this formula had the undesirable quality of a distinct reddening of the dark meat and a marked pinking of the white meat. This is undoubtedly caused by the saltpeter in the formula. Such a reddening in this type of product is undesirable.

Formula 2 was prepared using a commercial smoked-salt preparation and the following ingredients:

Formula 2

Plain salt	3½ lb.
Smoked salt	½ lb.
Sugar	30 oz.
Celery extract	2 gm.
Pepper extract	4 gm.
Parsley extract	4 gm.
Sage extract	1 gm.
Thyme extract	1 gm.
Marjoram extract	1 gm.
Water	5 gal.

Again the product was not desirable, since saltpeter is apparently included in the smoked salt. In addition, an uneven surface discoloration was produced, apparently by the smoke ingredients of the salt. Furthermore, the flavor of the finished product was not especially pleasing. Formula 2 was prepared with spice extracts instead of raw spices in order to cut down bacterial contamination of the pickle.

More recently we have used essential oils in a formula of the following composition.

Formula 3

Water	5 gal.
Salt	4 lb.
Sugar	30 oz.
Oil of celery	8 c.c.
Oil of black pepper	8 c.c.
Oil of parsley leaves	8 c.c.
Oil of sage	5 c.c.
Oil of thyme	5 c.c.
Oil of marjoram	5 c.c.
Oil of bay leaves	6 c.c.
Oil of sweet basil	6 c.c.
Oil of coriander	5 c.c.
Oil of cardamom	5 c.c.

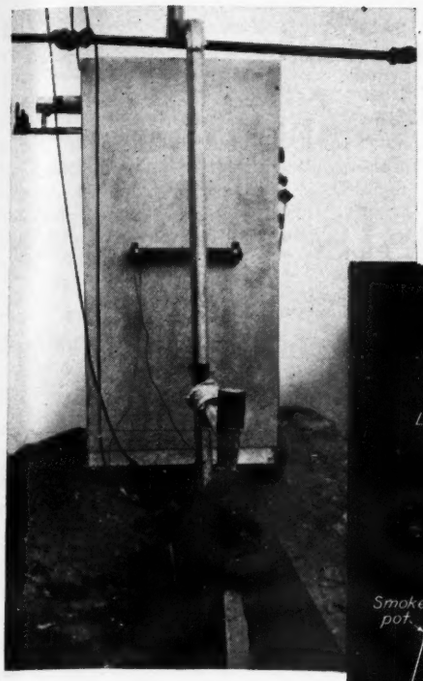
These oils were dissolved together in 200 c.c. of ethyl alcohol. To prepare 5 gal. of pickle, 4 lb. of salt and 30 oz. of sugar were used. Twenty-two cubic centimeters of the alcoholic solution of essential oils was added to a small amount of the sugar, together with about one gram of gum tragacanth, and the whole thoroughly mixed with a mortar and pestle. The remainder of the sugar and salt was dissolved in 5 gal. of water to which the essential oil-sugar-tragacanth material was added slowly with constant stirring. Properly prepared, the pickle should have a cloudy appearance.

Formula 3 was found to be superior for imparting a more desirable flavor to the finished product. For production, we would recommend Formula 3. It

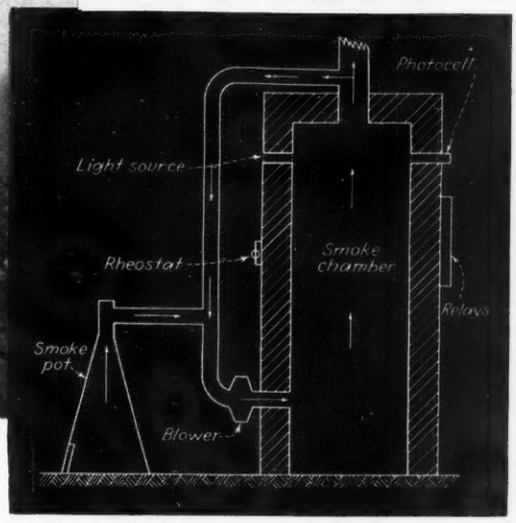
Table I—Bacteria per Gram of Sample (30 deg. C.) in Flavoring Ingredients.

Ingredient	Raw spice	Spice extract	Spice oil
Celery	*	1,490	0
Black pepper	1,500,000	500	0
Parsley leaves	*	131	0
Sage	500	45	0
Thyme	10,500	8,500	0
Marjoram	41,000	5,000	0
Sweet basil	*	35	0
Bay leaves	4,200	*	0
Coriander	*	2,600	0
Cardamom	*	*	0

* Represents no sample run.



Photoelectrically controlled smokehouse, showing smoke pot in foreground.



Schematic diagram of experimental smokehouse used in poultry smoking tests.

should be borne in mind that individual tastes differ and that these formulas serve largely as guides for the producer.

The bacterial contamination of the pickle by essential oils is negligible, whereas, with the addition of raw spices or spice extracts, appreciable numbers of undesirable bacteria may be introduced. Furthermore, an alcoholic solution of essential oils offers a simple means of preparing a relatively large amount of stock flavoring solution in such a form that it may be easily added to the pickle at the time of preparation.

The pickle should be placed preferably in a stone crock or in a paraffin-lined barrel, since both of these containers are easily cleaned at the end of the pickling process.

The pickling process should be carried out at a cool temperature. Without refrigeration it would be necessary to pickle in the fall or winter months. Temperature and humidity conditions differing from those experienced in the New England area may play an important part in determining pickling and smoking operations. High temperatures and relative humidities would practically demand the use of refrigeration during pickling operations, while high humidities will cause difficulties in the smoking operation because of excess sweating on the poultry in the smoking chamber.

In our experiment, the pickle room is refrigerated to about 40 deg. F. At this temperature, little bacterial growth occurs in the pickle during the time employed for pickling. The pickle should never be used more than once, and at the end of each batch the pickle tanks should be thoroughly washed and allowed to dry before using again.

The poultry should remain in the pickle approximately one and one-half days per pound of dressed weight. At the end of this time it may be removed and roughly dried with paper towels. It is sometimes desirable to allow the birds to hang overnight before placing in the smokehouse.

Smoking

In smoking, the bird should be so hung with twine that as large a body surface as possible is exposed. The use of wire hooks for hanging in the smoke is undesirable, since in the presence of smoke discoloration of the finished product occurs.

As taste tests have indicated that most people prefer a light smoke, the birds were smoked from six to nine hours at a temperature of 110 to 115 deg. F. Density of smoke in the smoke chamber was controlled by means of a photoelectric device connected with a blower. This device was so adjusted that approximately 160 foot-candles of light fell on the photoelectric cell. With the method employed, experience has shown that it is almost impossible to secure an even color over the entire surface of the product. This in no way detracts from the edibility, but may affect the eye appeal of the product.

Reports indicate that green apple wood has been used in preparing smoked turkey. In our experiments, corn cobs, green alder (*Alnus sp.*), yellow birch (*Betula lutea*) and wood of the common juniper (*Juniperus communis*) were utilized. Some interesting differences were noted.

The corncobs produced the darkest color as well as the strongest smoked taste, and seemed to promote better keeping qualities in the finished bird. The green alder gave a lighter smoke, which was very pleasing. Yellow birch was also suitable. The juniper wood, *i.e.*, without the leaves, produced a very interesting product. The color was light and the flavor rather aromatic and peppery. The writers are informed that juniper wood is successfully used in some foreign countries; for example, in Poland for the smoking of game and pork products. Other woods such as hickory, oak and maple may be satisfactorily used in the smoking operation.

Following the smoking operation, the product should be refrigerated, as it is perishable. For short-time storage, packaging or wrapping with parchment or waxed papers appears to be feasible. Such wrappings should be so applied as to permit some access of air. Otherwise, on long storage molding may develop. For short-time storage, that is, one or two weeks, 35 to 40 deg. F. seems adequate. At least one producer has used ultra-violet light to control the mold problem, but other methods may be satisfactory.

The ideal method of preparation for long-time storage of this smoked product would be freezing and keeping in the frozen condition until used by the consumer. In this instance, a transparent wrapper similar to Cellophane would seem to be suitable.

With regard to costs, the following estimates on an experimental basis have been determined.

Assuming a cost of 25 cents per pound of bird on a dressed-weight basis, the cost of production of the finished and packaged product would range from 45 to 50 cents per pound. Freezing of the packaged product would increase the cost per pound above the figures mentioned.

Smoked poultry should not be eaten raw. While cooking, it should be supported on a trivet or rack in order that some salt, which would give an over-salt taste to that portion of the bird lying on the bottom of the roasting pan in contact with the juice in the bottom of the pan would be removed with the juice.

Acknowledgment

The authors wish to express their appreciation to Prof. J. Robert Smyth, Head of the Department of Poultry at the University of Maine, for his wholehearted cooperation and suggestions, as well as for supplying much of the raw product used in this investigation.

Foolproof Check System Cuts Truck Costs

Method spots small repairs before they grow into big ones. It also gives close check on gasoline mileage and eliminates inefficiency and waste

KEEPING on top of truck repairs and making an accurate daily check or inventory of gasoline are, respectively, two of the most important items in the maintenance and operation of truck fleets in the food field.

"Keeping on top of truck repairs" is automotive slang for some means whereby necessary small truck repairs are discovered and attended to before these small repairs grow into big jobs with a proportional increase in cost.

An accurate check on the consumption and inventory of gasoline is of great importance because fuel costs may run to 25 or 30 percent of truck operating costs. Hence any elimination of waste or any improvement in miles per gallon result in considerable savings in dollars and cents.

There are many different ways in which minor repairs on food trucks can be determined or indicated. One of the most successful of these ways is that employed by the C. D. Kenny Co., wholesale grocers and tea and coffee distributors with headquarters in Baltimore.

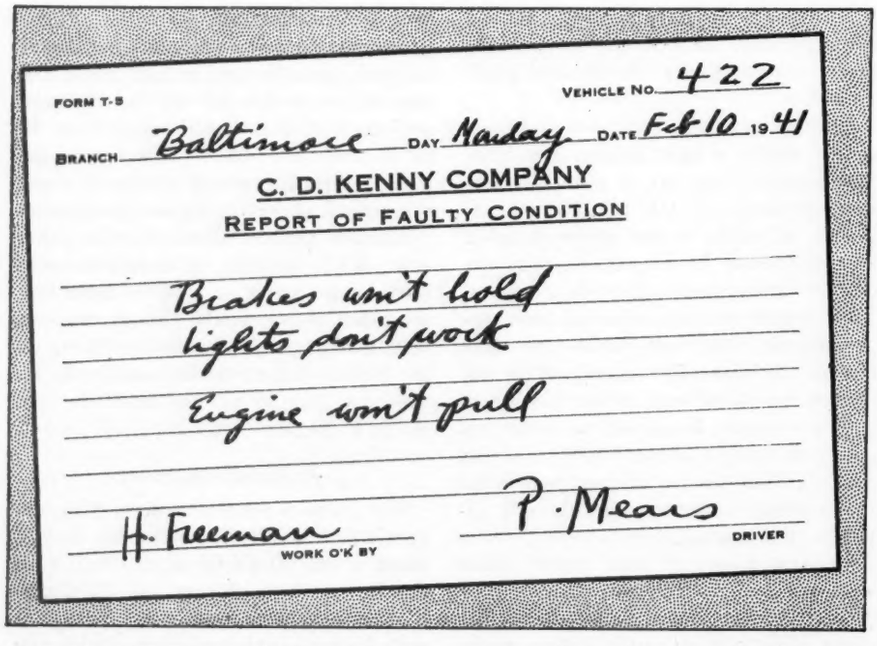
The key man in the Kenny system is the truck driver. When a man operates a truck for ten hours a day, week in and week out, he should know more about it than anybody else. Using the driver's intimate knowledge of his truck, the Kenny system, in brief, is to provide some easy means whereby the driver can each day put into writing what is the matter with his truck. This means is a simple little 4 x 6-in. printed form such as shown filled out in Fig. 1.

The driver is given one of these blanks forms each morning and fills it in at the end of his day's work. If his truck has nothing the matter with it, he simply marks the form with an "OK" and turns it in. It is most important in the functioning of the system that the driver turn in the form every day, whether his truck needs repairs or not. The forms are given to the shipper or man in charge of the drivers, and he in turn gives them to the man in charge of truck repairs.

When the man in charge of truck repairs arranges the reports in numerical order according to truck numbers and does not find a signed report for each truck in operation, he knows that the driver of the truck whose report is missed either failed to make out a report or that the report is missing for some other reason. He immediately calls upon the shipper to provide the necessary form.

If the forms were only filled out on those trucks on which work was to be done, the head mechanic would never know whether a report was missing or the truck was supposed to be OK. So to make the system foolproof, a report is made out for each truck each day.

The driver simply indicates the symptoms of the trouble on the report, such as "The brakes won't hold." It is the function of the repair department to find out why and correct the condition before the truck is sent out to work the next day.


FORM T-5

VEHICLE NO. 422

BRANCH Baltimore DAY Monday DATE Feb 10 1941

C. D. KENNY COMPANY

REPORT OF FAULTY CONDITION

Brakes won't hold
lights don't work
Engine won't pull

H. Freeman
WORK O'K BY

P. Mears
DRIVER

Fig. 1. The C. D. Kenney Co. Report of Faulty Condition filled in by each truck driver each day to catch the small repair jobs before they grow into big ones and cost real money.

Order of Repairs Determined

When the head mechanic assembles the Reports of Faulty Condition for a day's work of the fleet, he goes through the reports and determines the order in which the work should be done. Brake adjustments are made immediately, while other repairs which do not seriously affect the truck's safe operation may be put off for several days if necessary.

When a faulty condition indicated on a given day's report is not corrected by the repair force before the driver takes the truck out for its next day's work, the driver is instructed to report the same condition on the next day's report and keep on reporting it until the work is finally done. This continued reporting of the faulty condition in writing until it is remedied protects the driver in case the truck is involved in an accident in event the vehicle does not perform satisfactorily. It also serves as an excellent

Fig. 2. **The use of this form assures an accurate daily check on gasoline and oil consumption to eliminate shortages. Subtracting the initial pump-meter reading from the final meter reading gives the total number of gallons of gasoline withdrawn. When the meter reading for each withdrawal is inserted, the pump reading must correspond with the amount charged to each truck and signed for by the driver as shown.**

Form T-2 Day Monday Date Feb 10 19 41

Branch Baltimore

C. D. KENNY COMPANY

DAILY GASOLINE AND OIL REPORT

Veh. No.	Driver	Oil Qts.	Gasoline Gals.	Gasoline Meter
				44960
407	J. Smith	1	5	-965
409	B. Brown	0	3	968
410	H Smith	0	8	976
420	J. CONOVER	2	14	990
421	W. D. Stevens	2	18	45008
422	P. Means	0	13	021
423	D Gorsuch	1	12	033
424	J. P. Hunt	2	15	048
430	B Snyder	2	10	058
460	A Stetson	2	9	067
461	F. Frick	2	14	081
465	D. Bosen	1	10	091
470	K. Murphy	1	12	103
471	L. Reder	1	14	117
474	D. DeCoy	1	15	132
520	K. Young	2	18	150
521	K Anderson	1	10	160
621	T. White	1	8	45168
Totals		22	208	

H. Freeman (Driver)

Meter Reading, P. M. 45168
Meter Reading, A. M. 44960
Difference in Reading 208 Gals.
Drawn Today, Above 208 Gals.
Overage or Shortage 0 Gals.

check on the efficiency of the repair department.

The forms are kept active in the shop until the work is done, at which time the man doing the work signs his name at the lower left corner. Then they are filed away by truck number, with the latest report on top. If a driver reports the same faulty condition a short time after having reported the same trouble previously, it is an easy matter to thumb back the previous reports and find the name of the man who did the repair work in the first place. This keeps the mechanics on their mettle to do good work.

No Driver Alibis

The system further eliminates all word-of-mouth reports on faulty conditions. If a driver reports his truck OK, he cannot claim that it's faulty condition resulted in an accident or prevented him from doing a good day's work.

The system protects both the driver and the shop, guarding the former against inattention to reported necessary repairs or slovenly work by the shop, and protecting the shop against the abuse of the truck by the driver.

All the above are factors which help to reduce the cost of repair work. But the daily reporting of the faulty condition by the man best informed to know about it catches most all of the little jobs before they grow into big ones. This very definitely cuts the cost of truck repairs over any given period.

Check on Gasoline Needed

Because fuel expense represents such a large percentage of truck operating costs, it is necessary to keep an accurate check on every gallon of gasoline bought and where it goes and what it does. Here again it is necessary to make the check at the close of every day's work. Otherwise any shortages discovered at the end of the month are almost impossible to trace.

Here again the C. D. Kenny Co. makes use of a simple Daily Gasoline and Oil Report, shown in Fig. 2. This is used along with the Daily Truck Report shown in Fig. 3 and has eliminated all gasoline and oil shortages and also saved money by showing up trucks which were "gas eaters" because of faulty mechanical condition or improper carburetor adjustment.

In the use of the Daily Gasoline and Oil Report, the man in charge of the pump records the meter reading each time that gasoline is drawn. The difference between the current meter reading and the previous reading must correspond with the amount charged out. In this manner, there can be no shortage at the end of the day.

Form T-3 (Small)

C. D. KENNY CO.

Day Monday Date Feb 10 19 41

Branch Baltimore

DAILY TRUCK REPORT

Signed C. P. Bradley

Truck No.	Truck Make	Tons Cap	Driver	Time Out	Time In	Route	No. Trips	Speedometer Start	Speedometer Finish	Miles Run	Gals. GAS	OIL Qts.	No. of Stps.	Wght. Moved Lbs.	Remarks
407	Ford	1½	J. Smith	8:30	5:10	E. Falls	2	44620	-654	34	5	1	44	8560	
409	Chev	1½	B. Brown	8:15	4:50	W. City	2	91126	-242	16	3	0	38	6440	
621	Mack	2	T. White	8:40	5:30	Public	1	62301	-332	31	8	1	32	7550	
TOTALS							60	—	—	454	208	22	722	144260	

DAILY GASOLINE SUMMARY

On hand, a. m. 295 Gals.
Received today 550 Gals.
Total 845 Gals.
Drawn today 208 Gals.
Balance on hand, p. m. 637 Gals.

Meter reading, p. m. 45168
Meter reading, a. m. 44960
Difference in reading 208 Gals.
Drawn today 208 Gals.
Overage or Shortage 0 Gals.

DAILY OIL SUMMARY

On hand, a. m. 185 Qts.
Received today 0 Qts.
Total 185 Qts.
Drawn today 22 Qts.
Balance on hand, p. m. 163 Qts.

DAILY ANTI-FREEZE SUMMARY

On hand, a. m. 178 Qts.
Received today 0 Qts.
Total 178 Qts.
Drawn today 0 Qts.
Balance on hand, p. m. 178 Qts.

Fig. 3. **The daily gasoline and oil report summaries given in Fig. 2 are transferred to the above form used as a master control sheet on each day's motor-truck operations. In the form proper, dividing the miles run by the number of gallons of gasoline used by each truck gives the average miles-per-gallon gasoline consumption for that truck. When the consumption is higher than it should be, it indicates some irregularity in charging out the gasoline, poor mechanical condition of the truck or improper carburetor adjustment. This makes it possible to discover and correct a fault before much waste occurs.**

Adopt Better Truck Designs

Bottlers use special bodies on COE chassis which give greater payload, lighter weight and higher advertising value

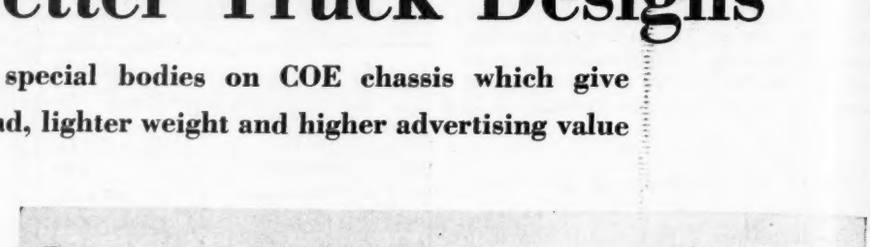
ADVERTISING value and light weight are two of the most important factors in the design of bottlers' motor truck bodies. How these features have been incorporated in several Far-West bottlers' bodies is shown in the illustrations on these pages.

All of the bodies shown were designed and built by the Advance Auto Body Works of Los Angeles, Calif. That of the Dr. Pepper Bottling Co., the use of whose trucks was described in the April, 1941, issue of FOOD INDUSTRIES. gets its high advertising value through the use of a close-coupled International cab-over-engine chassis and a well-proportioned shelfless and roofless body with rounded corners and tops on the front and rear transverse ends of the body.

While the Dr. Pepper company has made for its bodies tarpaulin covers which may be fitted over the front and top of the body and fastened over the payload with straps inserted in Footmen loops, these are only occasionally used due to the small number of rainy days per year, from 18 to 30, in the Southern California territory.

The shelfless type of construction speeds up the body loading and thereby reduces labor cost when the body is loaded from the side from deck-high loading platforms.

The Dr. Pepper body when used on either the Chevrolet or International chassis weighs from 1,650 to 1,700 lb. Without the use of duralumin, which is now unobtainable because of defense priorities, the relatively low weight of the Dr. Pepper body is secured through the use of 20-gage body steel for the inner corrugated wearing surfaces, except the floor, which is made of 14-gage Corten steel, electrically spot-welded to the steel cross sills, and Corten steel for the framework, 14-gage for the cross bars and 16-gage for the vertical posts.



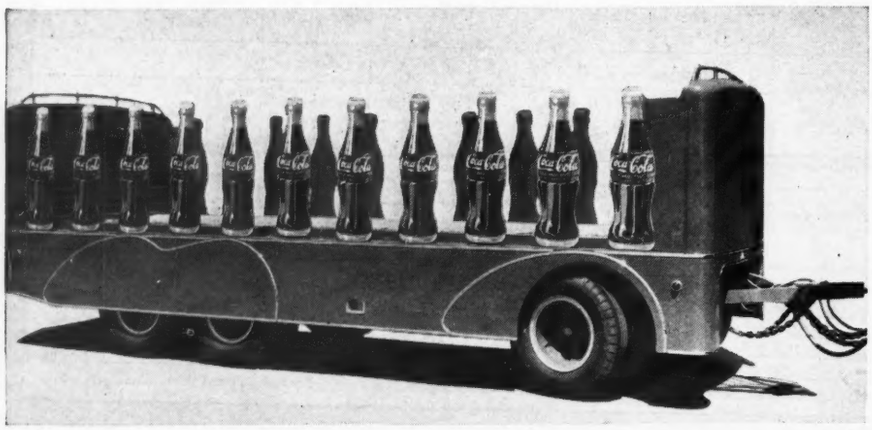
One of more than 100 standardized duralumin-made bodies built by the Advance Auto Body Works for the Coca-Cola Bottling Co. of Los Angeles. This extremely lightweight body features the use of huge Coca-Cola "bottles" at each corner, hinged on vertical piano hinges so that they can be swung outward like doors to permit the loading and unloading of the end stacks of cases.

The notching or shrouding of the front transverse end of the body around the rear of the driver's cab helps to improve the appearance of the front end and provides the necessary clearance between the cab and the body to take care of the weaving between the two when the truck is traveling over rough roads.

The space between the front and rear surfaces of the rear transverse member of the body is formed into a compartment which extends clear across the body. This is used for carrying advertising display material. The latter is inserted and removed from the compartment through a door on the left side of the body. The joints of the door are trimmed with molding so that the door fits into the lines of the body and is hardly noticeable.

The body has a capacity of 192 cases. These are loaded ten cases lengthwise, four cases across and five cases high, totaling 200 cases less the eight cases eliminated by the two rear wheelhousings. The body floor is flat, but the outer row of cases is tilted 3 in. on a rail alongside the outer edge of the floor to thus lock the inner cases in place.

The Advance Auto Body Works has also furnished the bodies for the Coca-Cola Bottling Co. of Los Angeles for several years and has developed for that



Of unusual advertising value, this six-wheeled trailer body, made of duralumin parts by the Advance Auto Body Works of Los Angeles, Calif., for the Coca-Cola Bottling Co. in the same city, carries 100 more cases than the same body of usual construction. The side-stake "bottles" are made of 14-gage duralumin backed by two formed steel members.

company a standardized type which is shown in one of the illustrations on the opposite page. This body is much lighter than the Dr. Pepper design because of the use of duralumin and aluminum.

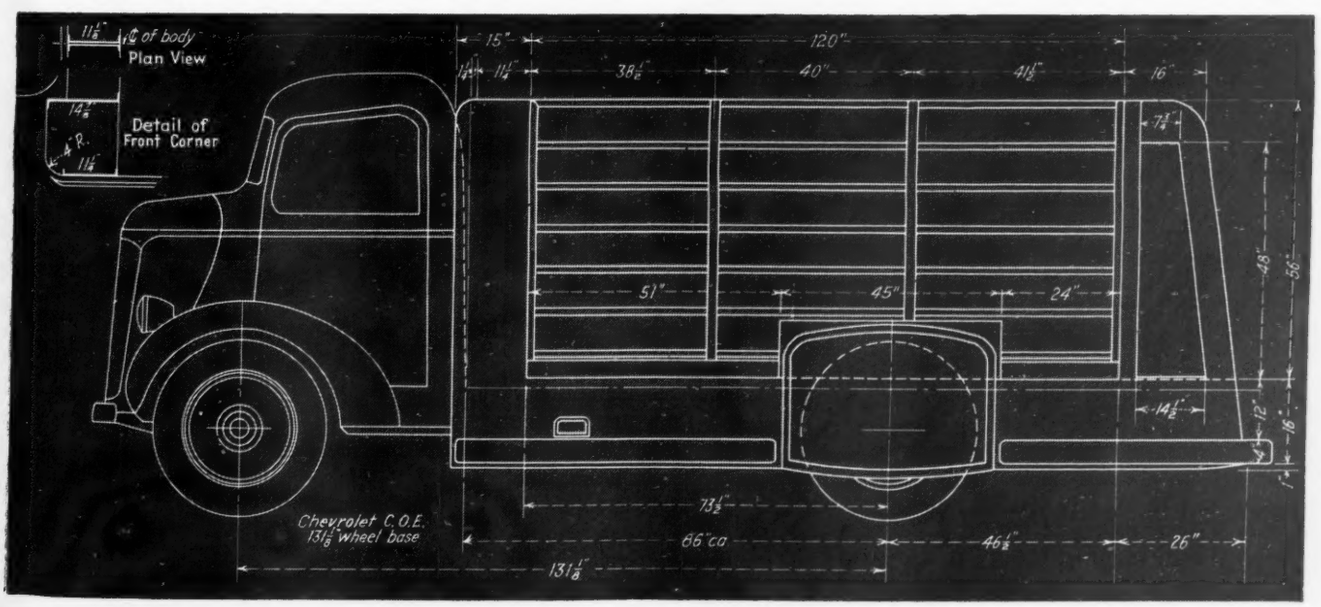
In the above Coca-Cola body, duralumin was used for the frame members and duralumin plate for the floor. The horizontal pipes are also of duralumin covered with stainless steel.

The advertising value of the body was further anhanced by the use of four large replicas of Coca-Cola bottles, one at each corner of the body. These bottles were also made of 14-gage duralumin and were hinged on vertical chrome-plated piano hinges to swing outward to permit the loading and unloading of the end stacks of cases. Each door-like "bottle" is held in place in its closed position parallel with the side of the body by means of a snap lock.

The Los Angeles Coca-Cola Bottling Co. has over 100 of these standardized bodies in service, as well as several six-wheel trailer units with special bodies such as shown in the other illustration on the opposite page. This body gets its unusual advertising value by the use of side stakes faced on the outside with huge Coca-Cola "bottles" the same as those used at the corners of the conventional truck body.

The "bottles" were again made of 14-gage duralumin backed by two formed steel-stake members. By the use of the light-weight material in other parts of the body, the payload of the trailer was increased by 100 cases as compared with the same body of conventional construction.

Three-quarter front and rear views of the well-proportioned bottlers' body used by Dr. Pepper Bottling Co. of Los Angeles, Calif. It carries a total load of 192 cases. Without shelves and roof, it is easy to load and unload. Inside the rear transverse member of the body is a full body width compartment used to carry display advertising matter. This compartment is reached through a concealed door on the left side.



Dimensional details of the standardized Dr. Pepper Bottling Co. body as designed for 131⅛-in. Chevrolet cab-over-engine chassis. This is the same body as shown in the above two illustrations. Note how the front of the body is notched around the rear of the driver's cab for the sake of appearance while at the same time leaving clearance to allow for weaving when the truck is traveling over rough roads. The projecting body corners cover the gap between cab and body.

How To Make Naturally Flavored Maraschino-type Cherries

Many people dislike the artificial flavor, so methods have been worked out for flavoring colored cherries with natural cherry sirups

BY F. A. LEE,* New York State Agricultural Experiment Station, Geneva, N. Y., and E. A. BEAVENS,† Bureau of Agricultural Chemistry and Engineering, U. S. Department of Agriculture, Geneva, N. Y.

IT is well recognized that the use of maraschino-type cherries in foods and beverages is purely for decorative purposes, and no similar product lends color so effectively. However, a number of people dislike the peculiar artificial flavor of many of the products found on the market today, and the statement "omit the cherry" is not infrequently heard. Cherries as gathered from the orchard cannot be processed into the colored product and still retain their natural flavor. Not only must the fruit be bleached so that a uniform color can be obtained by dyeing, but it must be hardened if the resulting colored cherries are to meet the demands of the trade.

The authentic imported colored cherries are packed in glass and covered with a liqueur or cordial called "maraschino," which is a distilled product made from the fruit and young leaves of the Marasca cherry tree. This Marasca cherry is a small, wild, sour, black variety grown in the province of Dalmatia.[2] The liqueur is exported from the city of Zara, which is now a part of Italy. Apparently, the original maraschino cherries were made by covering the Marasca cherries with maraschino liqueur, but it is very likely that because of the increased demand other cherry varieties were used and covered with the genuine maraschino liqueur. In this country the domestic product is ordinarily made by covering cherries of the Napoleon (Royal Ann) variety, which have been hardened and dyed, with a heavy sugar sirup flavored with an artificial maraschino flavor, usually benzaldehyde with or without other flavoring materials. These are preserved by the use of benzoate of soda, in addition to pasteurization. It is the purpose of this paper to provide processors with methods for producing naturally flavored colored cherries in order to create a greater demand for this type of decorative food product. Such a processed cherry would be American in character and made from natural flavoring materials wholly produced in America. Also, the manufacturer would be able to eliminate the artificial flavor caption now required on the label.

In preparing naturally flavored cherries, having the required firmness and color, it was necessary to bleach[3] and dye[4] the stem and pitted fruit in the usual manner and finish it with sirups prepared from Montmorency and English Morello cherries. Sirups from these varieties were used separately and in various combinations to determine those having the best flavors. Different sugar strengths of the several cherry sirups were also tested. It was found that many of the colored cherries flavored with the natural cherry sirups were pleasing to the eye and especially to the palate. Several of the combinations of whole or crushed cherries were found to be especially good as a topping for ice cream.

Methods and Results

The Napoleon (Royal Ann) variety of cherry was used throughout these studies. The cherries were picked from the Experiment Station orchard just short of market ripeness, stemmed and covered with a standard brine solution[3] so as to bleach and harden the fruit simultaneously. After the customary period of approximately six weeks for bleaching, the cherries were drained, washed and pitted. The sulfur dioxide remaining was removed from the pitted cherries by slowly boiling for two hours or until tender, during which time the water was changed at four intervals. Other workers remove the residual sulfur dioxide by a leaching with cold water.[5] The fruit was then brightened by covering with a 1 percent solution of citric acid and heated just below the boiling point for 15 minutes.

The natural cherry sirups to be used in flavoring the dyed cherries were prepared from juices of the Montmorency and English Morello varieties. In general, these sirups were made by adding sugar to clarified, hot- and cold-pressed cherry juices to give final concentrations of 25, 35, 50 and 65 deg. Brix.

The procedure for hot-pressing the cherries consisted of heating the acid-washed‡ and crushed fruit to 150 deg. F. and pressing in a rack and cloth hydraulic press.[6] The hot juice was put through a fine-mesh screen of corrosion-resistant material to remove coarse particles, heated to 185 deg. F. to coagulate the pectinous material and cooled to 100 deg. F. or lower. The juice was then clarified by adding approximately 0.5 percent of a filter aid such as "Hydro Super-Cel" and filtering through canvas in a plate and frame filter press. Hot-pressed Montmorency juice is a brilliant red color while that from the English Morello is a deep red (Burgundy) color.

Cold pressed juices were made by first thoroughly crushing the acid-washed cherries without breaking more than a few of the pits and pressing the macerated fruit in a hydraulic press. The juice was strained through a fine-mesh screen of corrosion-resistant material, heated to 130 deg. F., approximately 0.1 percent of the pectic enzyme preparation "Pec-

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† Agricultural Chemical Research Division Contribution No. 10.

‡ The acid-washing solution, which washes the fruit and removes spray residues, may be made by diluting concentrated hydrochloric acid in the proportions of one quart of the concentrated acid to 16 gal. of water.

tinol" added, and the juice allowed to stand at this temperature for about two hours. The juice was then heated to 180 deg. F in order to inactivate the pectic enzyme, cooled to 100 deg. F., and filtered clear as described under hot-pressing. Cold-pressed cherry juices are not so deep in color as the hot-pressed juices, but their flavor more closely resembles that of fresh cherries.

The sirups were prepared by adding to the hot- and cold-pressed cherry juices sufficient sugar to give final concentrations of 25, 35, 50 and 65 deg. Brix. The sirups were thoroughly mixed and preserved in glass containers by flash pasteurizing at 180 to 185 deg. F. and cooling rapidly.

The next step in the process was dyeing the cherries and raising the sugar content of the flesh to approximately equal that of the natural cherry sirups with which they were to be covered. It is necessary to do this to prevent the wrinkling of the cherries that would result from too great a differential of sugar strength between the cherries and the finishing sirups.

The basic procedure for dyeing and sweetening the cherries consisted of covering 1 lb. of the fruit with a solution containing 3½ grains of Ponceau 3 R, certified food color (FD&C Red No. 1), 10½ fl. oz. of water and 2 oz. of sugar. This mixture was brought nearly to boiling after each of three successive 24-hour periods of standing at room temperature, with the addition of 2 oz. of sugar to the solution before each heating. The cherries were drained and carefully packed into half-pint glass jars. Cherries so treated can be covered with sirups of 25 and 35 deg. Brix with little danger of wrinkling. Cherries to be covered with sirups of 50 and 65 deg. Brix were dyed and sweetened in a similar manner except that 4 oz. of sugar was added to the dye solution at each stage in the process instead of 2 oz. as previously listed.

Individual lots of the cherries were finished by filling the jars with the 25, 35, 50 and 65 deg. Brix Montmorency and English Morello sirups, respectively, made from the cold-pressed juices. Other lots were prepared by using several combinations of the two sirups within the same sugar strengths, and similar combinations of the two sirups within each of the other sugar strengths mentioned. That is, one jar of cherries was covered with a 25 deg. Brix Montmorency sirup, and another was filled with a 25 deg. Brix English Morello sirup. Finally, one jar each was filled with mixtures of sirups made by adding 9, 8 and 7 parts, respectively, of the 25 deg. Brix Montmorency sirup and 1, 2 and 3 parts, respectively, of the 25 deg. Brix English Morello sirup. All sirups were heated to 180 deg. F. before covering the cherries, 0.1 percent benzoate of soda was added and the bottled products pasteurized at 180 deg. F. for 20 minutes. The same procedure was applied to each of the other three sugar strengths of both varieties. Another lot of samples was covered with sirups of 65 deg. Brix prepared from hot-pressed Montmorency and English Morello juices, using the individual and the several mixtures of the two sirups as listed before.

Duplicate sets of samples were prepared as described above, using the Montmorency and English Morello sirups made from both cold- and hot-pressed juices, and an artificial maraschino flavor added to each container to determine whether or not such a combination would have any flavoring advantages over the natural or artificial flavors used alone. One control sample of cherries was prepared using artificial Maraschino flavor in a 50 deg. Brix sugar sirup.

The bright color of maraschino-type cherries adds eye and appetite appeal to many dishes, but some consumers object to the taste of the artificial flavor used in processing the cherries.

In general, it was found that about half of the people in a limited group of tasters preferred the naturally flavored cherries to those flavored artificially. This result is about what one would expect, since it is reasonable to assume that about half of the consumers would have had a taste established for the artificial maraschino flavor through long usage.

During the tasting tests on the cherries alone, it developed that most of the people in the group preferred those cherries which had been finished with the 65 deg. Brix Montmorency sirup made from cold-pressed juice. Next in order of preference was a group of five samples which were given approximately the same ratings in flavor and appearance. These consisted of one sample finished with a blend of 9 parts of a 65 deg. Brix (cold-pressed) Montmorency sirup and 1 part of 65 deg. Brix (cold-pressed) English Morello sirup. Another was finished with 8 parts of a 65 deg. Brix (hot-pressed) Montmorency sirup and 2 parts of a 65 deg. Brix (hot-pressed) English Morello sirup. A third was finished with a 25 deg. Brix (cold-pressed) Montmorency sirup and a fourth and fifth with 35 or 50 deg. Brix (cold-pressed) Montmorency sirups, respectively. Those cherries finished with the 25, 35, 50 and 65 deg. Brix English Morello sirups took on a dark brownish-red color and had a pungent, undesirable flavor.

This darkening of color greatly reduced the decorative value of the dyed cherries. Those cherries finished with sirups containing 3 parts or more of the English Morello sirup, in combination with the Montmorency sirup, were usually off-flavor, particularly those in the lower sugar concentrations. As a matter of curiosity one lot of cherries was finished in a "cherry cocktail" beverage[6] made up of 3 parts hot- and cold-pressed Montmorency juice, 1 part hot- and cold-pressed English Morello juice and diluted equal parts with a 15 deg. Brix sugar sirup.

The cherries finished in this manner were poor in color and flavor.

The combinations of artificial and natuural flavors were found to possess no

real advantages over either one of these two used separately. A real disadvantage would be the fact that the manufacturer would still be required to declare the presence of the artificial flavor on his label.

On the basis of the organoleptic tests on the finished cherries, those lots given the highest ratings were crushed and used as sundae toppings on ice cream. The combinations of 8 parts hot-pressed and 9 parts cold-pressed 65 deg. Brix Montmorency sirups mixed with 2 parts hot-pressed and 1 part cold-pressed 65 deg. Brix English Morelle sirups, respectively, were preferred over the straight Montmorency 65 deg. Brix sirup which was rated best when the cherries were tasted alone. In general, the cherries finished in the heavier sirups were found to be more pleasing to most tasters when eaten alone or on ice cream than those finished in the lighter sirups.

It should be taken into consideration that dyed cherries, naturally or artificially flavored, should be judged as to these flavors when used as a topping or decoration in conjunction with food products as they would normally be consumed. It is only in this way that a reasonably accurate estimate of their quality can be made.

Based on the experiments just described, the authors suggest the following as a commercial procedure for the coloring and flavoring of cherries.

Step 1. 100 lb. of bleached and pitted cherries. Sulfur dioxide is removed by slowly boiling for two hours or until tender, during which time the water should be changed at four intervals. Removal of sulfur dioxide by leaching with slowly running water for three days is used by some processors.

Step 2. Cover the drained fruit from Step 1 with a 1 percent solution of citric acid and hold at a temperature just below the boiling point for 15 minutes.

Step 3. Treat the drained fruit from Step 2 with a solution of 4/5 oz. of FD&C Red No. 1 (Certified Food Color) in 8 gal. of water and 25 lb. of sugar. Bring this mixture nearly to the boiling point (190 deg. F.) and allow to stand for 24 hours.

Step 4. Treat the cherries and sirup from Step 3 with 25 lb. of sugar and heat again to 190 deg. F. Allow to stand for 24 hours.

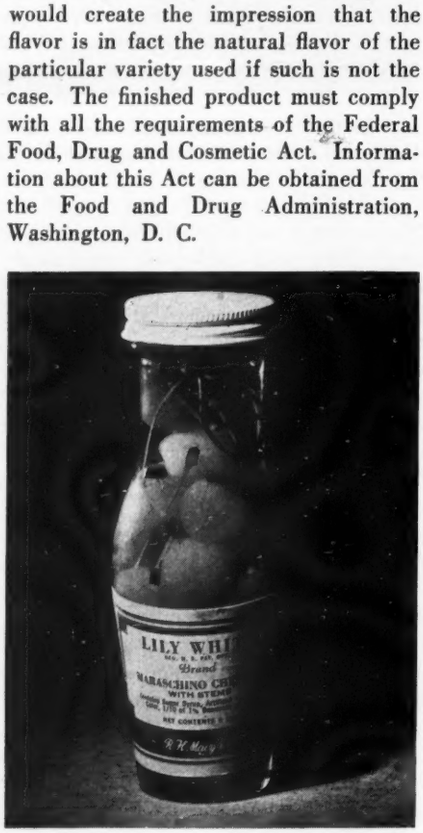
Step 5. Treat the cherries and sirup from Step 4 with 25 lb. more of sugar and heat again to 190 deg. F. and again allow to set for 24 hours.

Step 6. Drain off the sirup and pack the fruit into bottles. The bottles are then filled with either one of the following sirups heated to 140 deg. F., and 0.1 percent of sodium benzoate is added to each bottle. They are then pasteurized at 180 deg. F. for 20 minutes.
Sirup a—8 parts of hot-pressed 65 deg. Brix Montmorency sirup and 2 parts of hot-pressed 65 deg. Brix English Morello sirup.
Sirup b—9 parts of cold-pressed 65 deg. Brix Montmorency sirup and 1 part of cold-pressed 65 deg. Brix English Morello sirup.

Summary

Methods have been described for the flavoring of colored cherries with natural cherry sirups made from the Montmorency and English Morello varieties and yielding products that are satisfactory in color and flavor for use as edible decorations for desserts, beverages, salads and as toppings for ice cream. Within the limits of the organoleptic tests conducted it was found that the best cherries were those that had been finished with the 65 deg. Brix Montmorency sirup made from cold-pressed juice. For toppings on ice cream those cherries flavored with the combination of 8 parts hot-pressed and 9 parts cold-pressed 65 deg. Brix Montmorency sirups mixed with 2 parts hot-pressed and 1 part cold-pressed 65 deg. Brix English Morello sirups, respectively, were preferred over those flavored with the 65 deg. Brix Montmorency sirup. Those cherries treated with sirups of higher concentrations were better flavored than those treated with sirups of the lower concentrations.

Dyed cherries finished in natural cherry sirups would not have to carry a statement declaring the presence of artificial flavor on the label. It would still be necessary, however, to declare on the label the presence of artificial color and of citric acid. It might be well, also, to caution against any form of labeling that would create the impression that the flavor is in fact the natural flavor of the particular variety used if such is not the case. The finished product must comply with all the requirements of the Federal Food, Drug and Cosmetic Act. Information about this Act can be obtained from the Food and Drug Administration, Washington, D. C.



Jar of maraschino-type cherries with artificial flavoring.

Demand Increases

The demand for maraschino-type cherries has increased in recent years because of their value as an edible decoration for foods and beverages. In 1925 the total United States output of brined cherries was 15,400 bbl., and in the same year we imported 19,750 bbl. of brined cherries in addition to the equivalent of 36,720 bbl. of processed cherries. In 1930 domestic production amounted to 19,750 bbl., while we imported 89,500 bbl. and the equivalent of 3,600 bbl. of the processed fruit. In 1939 domestic production increased to 169,201 bbl., while at the same time importations fell to 4,429 bbl. and the equivalent of approximately 25 bbl. of the processed cherries. These figures indicate that the use of maraschino and glacé cherries has definitely increased, and at the same time our domestic production of both brined and processed cherries has almost completely replaced foreign importations. Of the total United States output in 1939, New York State contributed 10,000 bbl. of brined cherries, which was slightly under the record packs of 12,000 bbl. in both 1936 and 1937.[1] The value of the U. S. pack of finished maraschino-type and similar cherries for 1939 has been estimated at $4,500,000.

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Mycostatic Salts

(*Continued from page* 42)

the fillers and flats themselves remained mold-free. Further protection to the eggs was obtained when the wooden cases were dipped into a 0.5 to 1.0 percent solution of sodium pentachlorophenate prior to use. This treatment was particularly effective when the cases were made from cottonwood or gum lumber. Sitka spruce cases possess natural mold-resistant properties.

Although these studies were confined to eggs, the findings have application in connection with the storage of all perishables at near-freezing temperatures. They are particularly pertinent when mold growths develop at relative humidities sufficiently high to prevent moisture loss with resulting shrinkage or discoloration and quality deterioration.

Precautions Must Surround Addition of Vitamin C

Care to prevent oxidation of the ascorbic acid is most important. Possible methods for adding vitamin C also discussed

By G. O. CRAGWALL, *Chas. Pfizer & Co., New York, N. Y.*

BECAUSE of the susceptibility of vitamin C to oxidation when in solution, its incorporation in foodstuffs presents some difficulties. For this reason, it is being added to but few products at the present time. However, considerable thought has been devoted to solving this problem and a number of experimental investigations dealing with a variety of food products are being carried out as a result. Although little or no prior art exists dealing with this addition, nevertheless present knowledge of the physical and chemical properties of the vitamin makes it possible to offer more or less concrete suggestions as to the best method of handling it.

In the dry state the pure, crystalline vitamin is stable, so that its storage presents no problem other than that it be in a clean, dry room. As it is readily soluble in water, no special technic is required in the physical act of adding it to liquid or semi-liquid products. It is preferable to add it directly as the solid. Thorough mixing will then result in its uniform distribution throughout the liquid phase. Mixing should be of such a character as to incorporate as little air as possible in the product; a low-speed gate-type agitator, or possibly a side-entrance propeller-type, should be satisfactory. The use of an inert atmosphere. such as one of carbon dioxide or nitrogen, may also be found of advantage in reducing oxidation of the vitamin C during the mixing operation.

Deaeration Important

Removal of dissolved oxygen by deaeration, and destruction of oxidases, in some types of product, by heat or other means before adding vitamin C will also decrease oxidation. The economics of these operations should be considered carefully, however, since it may prove less expensive to add additional vitamin to allow for destruction of a small portion than to install the equipment and introduce the additional operations necessary to prevent it.

Since solutions of ascorbic acid are

G. O. CRAGWALL

susceptible to atmospheric oxygen, the use of stock solutions for the addition should be avoided wherever possible. If such a solution is necessary, it should be as concentrated as possible and should be prepared with freshly distilled water or freshly boiled water which is free of metallic impurities. Under no conditions should more than one day's supply of solution be prepared at a time and then only immediately before it is to be used.

Metals Catalyze Oxidation

The presence of iron or copper in a solution containing vitamin C catalyzes the oxidation, so it is evident that contact of the product with these metals, even before adding the vitamin, should be avoided. Glass, porcelain-enameled, aluminum, or stainless steel equipment can be used. Enameled equipment must, of course, be free from chips or cracks. Stainless steel tends to lose its passivity on prolonged contact with solutions containing the vitamin, so that it may be necessary at intervals to restore this characteristic of the metal by "pickling" with nitric acid.

Another point to be noted is that some of the accepted food colors are reduced by vitamin C. the latter being oxidized at the same time. Naturally, thought and experimentation must be devoted to avoiding this action, when it is desired to add the vitamin to a food containing an artificial color.

Avoid Heating

As the rate of oxidation of the vitamin by atmospheric oxygen is increased by increase in temperature, heating of the product to which it has been added should be avoided as much as possible, especially in contact with air. In some cases, such as in sterilization of the final packaged product, this heating operation cannot be avoided. When heating is necessary, it would be well to have as little air as possible in the package; and deaeration and replacement of the air by an inert gas would be of advantage, although possibly not absolutely necessary providing allowance is made for any oxidation which may take place.

When To Add Vitamin C

Because of the susceptibility to oxidation, it is evident that the addition of the vitamin should be made as late in the process as possible, preferably either to the final package or just before packaging. By this means, the chances of oxidation can be reduced to a minimum especially if the product is packaged in such a manner that there is a minimum of free air space.

In the dry state vitamin C is stable and it should be stable in dry products. In this connection it should be borne in mind that many apparently dry foods contain a considerable amount of moisture which may affect adversely the stability of the vitamin. Beyond insuring thorough dispersion, but few suggestions can be made as to the incorporation of the dry vitamin in dry products. It might be found of advantage to mix it with a portion of the batch and then mix this rich fraction with the whole. Needless to say, too large a differential in particle size should be avoided. In some cases it might be preferable to spray an alcoholic solution

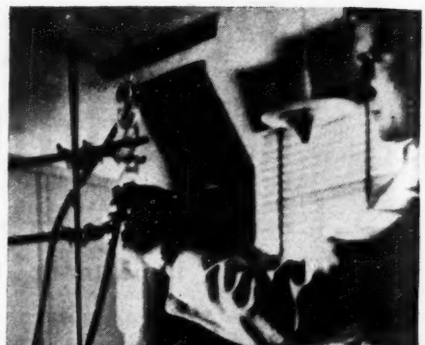
of the vitamin on the product and subsequently evaporate the alcohol. When foods are prepared by evaporation of a solution, the vitamin should not be added until after the evaporation step if possible; if not feasible to do this, vacuum evaporation should be employed.

Adding Vitamin C to Emulsions

This vitamin is practically insoluble in oils, as a rule 100 parts of oil dissolving only a few hundredths of a part. It can be added to emulsions, however, by dissolving in the aqueous phase. Protection of the vitamin is better in a water-in-oil emulsion than in one of the oil-in-water type, since in the former the water solution is surrounded by a film of oil, whereas in the latter the water phase is exposed to atmospheric oxidation.

Necessity for chemical analysis of the product for vitamin content, not only as prepared, but also after storage for maximum shelf life, must be emphasized. For this analysis, titration with standard 2-6 dichlorophenol-indophenol is generally used. For light colored products, such as the juices of citrus fruits, this titration can be made directly; in other cases various methods for extracting the vitamin are first employed, followed by the titration. Numerous articles describing the technics can be found in the literature. Occasionally substances, other than vitamin C, which reduce the indophenol may be present; when this occurs, due allowance for these must of course be made.

In every ton of vitamin C there must be 18,144,000,000 International Units. And to make certain that every bit of the material meets a long list of rigid specifications, many samples are taken and subjected to several delicate tests.



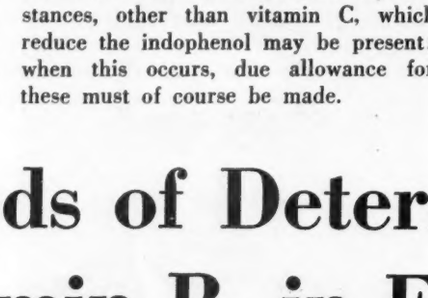
Courtesy Hoffmann-La Roche, Inc.

Methods of Determining Vitamin B_1 in Foods

Various methods are now available and the problems involved in their use indicate need for more reliable methods of easier applicability

By EARL D. STEWART, *Consumer's Yeast, Oakland, Calif.*

ASSAYING food products for vitamins and minerals, either naturally present or added as enrichment materials, is likely to be a matter of increasing moment to food chemists and food technologists. They are going to find that some ingenuity will be required to adapt known analytical methods or reactions to the foods or food products of immediate concern to them. Since vitamin B_1, or thiamin hydrochloride, has been one of the first vitamins to be considered in enrichment plans, a look at some of the problems involved in determining vitamin B_1 may be of interest and suggestive to those about to embark on the same or similar projects. Yeast, bread and bakery goods will be considered chiefly, but the factors to be kept in mind will be much the same for any food product.



EARL D. STEWART

First, it might be well to mention some of the chemical and physical properties of vitamin B_1 that the analyst must consider, or that he may avail himself of, in making an assay. Pure vitamin B_1 is a white, crystalline powder, of very slight saline taste and having a very faint odor suggesting acetamide. It is very soluble in water, dilute methyl or ethyl alcohol, as well as in benzyl alcohol and in phenol. It is insoluble in ether or isobutyl alcohol. Aqueous solutions (1:20) are acid to litmus (pH 3.5), and along with the acid alcohol solutions are quite stable to atmospheric oxidation, between pH2 and pH6. Oxidation is hastened as the pH approaches 7 and on the alkaline side may be quite rapid. It is advisable to prepare standard solutions of thiamin at about pH 4.0 in 20 percent ethyl alcohol solution and to preserve them in amber bottles in the refrigerator. This is not to protect them against oxidation but against microorganisms. Solutions showing mold growth, or suspicious filaments of any kind, should be discarded. Subsidiary working standards are best made by diluting the primary standard daily as needed, without attempting to preserve them. If the primary standard is made up to contain 0.1 mg. to 1.0 mg. per ml., dilution to 0.01 mg. per ml. or less is a simple matter, and no great loss is involved in discarding the solutions at the end of the day's tests.

Thiamin solutions are quite stable to heat when acid to the degree just given. Consequently, moderately high temperatures can be used safely in extracting foods for thiamin determinations, provided the pH is kept low, say around 3.0.

Occurrence of Vitamin B_1

In some food products, thiamin occurs both in the free form and as the pyrophosphoric acid ester or *co-carboxylase.* This co-enzyme may include 75 percent of the total thiamin in yeast, for example,

and since its chemical properties are distinct from those of thiamin, it must be dephosphorylated before applying a chemical assay method for vitamin B_1. Hennessey and Cerecedo (1939) suggested using a phosphatase prepared from kidney tissue for the dephosphorylation and give a method for preparing the enzyme. Auhagen (1933) showed that in autolyzing yeast co-carboxylase is destroyed; and Melnick and Field (1939), using Auhagen's principle, found that yeast powder would hydrolyze crystalline thiamin monophosphate quantitatively at 37.5 deg. C and pH 4.5 in 12 hours. Adherence to pH 4.5 is important, but 12 to 24 hours time made no difference. The hydrolysis was produced in one hour at 45 deg. C.

Emmett, Peacock and Brown (1940) suggest a digestion with taka-diastase and papain when determining thiamin in dried yeast, but they do not give any details of the method or the amounts of taka-diastase and papain to use in bringing about the hydrolysis. Taka-diastase alone (Hennessey, 1941) seems to be adequate.

Color Tests

Thiamin reacts to give colored compounds with a number of reagents and the azo reactions in which a dyestuff is formed by coupling the vitamin with a diazotized amino compound are the basis of the chemical methods of assay. These include the diazotized para-aminoacetophenone reaction, first studied by Prebluda and McCollum (1936, 1939) and reduced to quantitative form by Melnick and Field (1939), and somewhat modified by Emmett, Peacock and Brown (1940). The Melnick and Field method, and its modification by Emmett, Peacock and Brown, will be discussed in more detail presently.

Alkaline ferricyanide solutions oxidize thiamin to *thiochrome*, a substance that fluoresces blue under ultra violet light of wavelength 3,600 Angstrom units. This property has been utilized by a number of workers as a basis for assay of vitamin B_1, either by comparing photoelectrically the fluorescence of an unknown sample with that of a standard reference sample, as in the method of Hennessey and Cerecedo (1939), or by titration of a blank sample with standard solution of thiochrome until it matches the unknown placed along side of it (Wang and Harris, 1939).

Biological Tests

Thiamin has been shown to be necessary for the growth of several microorganisms in synthetic media. Thus, Knight (1937) showed that vitamin B_1 is necessary for the growth of *Staphylococcus aureus*. Schöpfer (1935) used the fungus, *Phycomyces blakesleanus*.

In 1937, Schultz, Atkin and Frey announced that thiamin stimulated alcohol fermentation by *Saccharomyces cerevisiae* in glucose-salts media. They devised a method for measuring the effect of known amounts of thiamin on gas production by yeast that gave satisfactory result for 0.5-4.0 micrograms of thiamin. Later (1939), these same authors announced an "ultra-micro-method" using a Warburg apparatus and a nitrogen atmosphere with which it was possible to determine 0.005 to 0.025 micrograms of thiamin with an error of no more than 5 percent.

Preliminary Considerations

Before using any of the methods just mentioned, some preliminary questions must be answered. These are,

1. How must the food be treated before taking a sample for assay?
2. How much thiamin is required for the assay?
3. How large an aliquot of the food in question must be taken to get the required amount of thiamin?
4. How shall the food be treated to get it into the form and concentration required for the method of assay that has been chosen?

A loaf of bread, for example, consists of an interior white crumb and an outer brown crust, which differ in moisture content at least, and the color of the crust suggests that it has been subjected to a higher temperature than the interior and is therefore probably lower than the crumb in thiamin content. Hoffman, et al. (1940), found that there is a baking loss of 5-9 percent in three types of bread, and up to 17 percent in toasting.

To get a truly representative sample of the whole loaf, it must be dried, ground, and an aliquot of the whole loaf used. It may turn out that a less clumsy way of sampling a loaf of bread may suffice, but the writer is not aware that any studies have been made on this point. With other foods of more uniform physical character, flour for instance, sampling is less of a problem.

Yeast, while probably uniform with respect to vitamin B_1 concentration at any given time, is alive and respiring. Consequently, its percentage of thiamin is actually increasing slowly. Hence, it should be dried at low temperatures, say 35-45 deg. C., and an aliquot used.

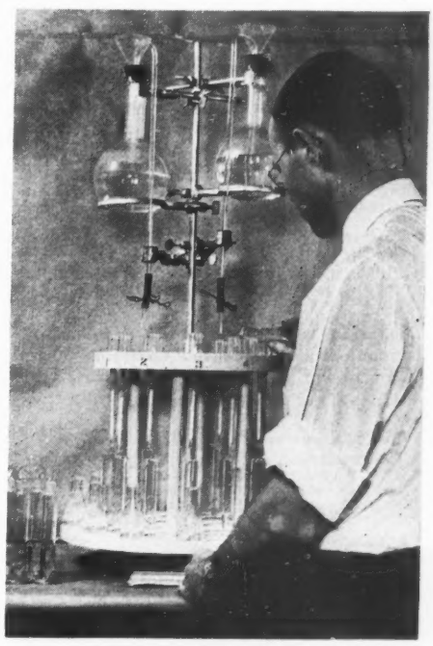
In general, if the customary unit of food is not uniform in composition in all of its parts, it is probably best to dry it and grind it and take an aliquot for analysis, or dissolve it and take an aliquot of the solution, unless it is known that a simpler kind of sampling will suffice. The main thing is to get a sample representative of the entire customary unit.

Amount of Sample

Assuming that the food to be assayed is in suitable form, so that a representative aliquot can be weighed or measured out, how much should be weighed or taken to get the required amount of thiamin for the assay? The fermentation method requires 2-4 micrograms, in a solution of 10 to 20 ml. The thiochrome method of Hennessey and Cerecedo requires one microgram in 5 ml., and for extraction and treatment of the sample it is best to start with a sufficient sample to contain 20-40 micrograms. The Wang and Harris thiochrome method requires 0.04-2.0 micrograms or one ml. of a solution containing 10 micrograms per 100 ml.

The Melnick and Field method calls for a sufficient sample to yield 120-150 micrograms; while the method of Emmett, Peacock and Brown requires a stock solution of test material containing 5-20 micrograms of thiamin per ml. or about 100 micrograms in all. It is evident that the colorimetric methods require considerably larger amounts of material, a circumstance that decidedly limits their applicability, especially if the food to be assayed is difficult to get into solution.

Knowing the amount of thiamin re-



Courtesy Victor Chemical Works

"Zeolite" test for determining amount of thiamin chloride (B_1) in foods. After isolating and determining the thiamin chloride, it is placed in a fluorophotometer for accurate measuring and further determination.

quired for the assay, we shall have to do a little intelligent guessing as to the size of the sample to use. Fortunately, the probable vitamin B_1 content of most processed foods is known within fairly narrow limits. Flour will vary from about 50 micrograms per 100 gm. for the usual patent flour to about 450 for the whole wheat or enriched types, and breads will cover about the same range. Bakers yeast varies from 2,000 micrograms to 20,000 for the plain yeast and enriched yeast respectively. These figures must be multiplied by the drying ratios, of course, when dried samples are used for assay.

Numerous lists have been published that will enable anyone to make an estimate of the amount of material to yield the proper weight of thiamin for the assay.

The next step is to get the sample into a suitable solution so that the assay chemical reactions can be applied. And here the trouble begins. Since the fermentation method of Schultz, Atkin and Frey requires the simplest preparation of sample, it will be discussed first.

Fermentation Method

The fermentation method of assay for vitamin B_1 requires a thermostatically controlled bath held at 30 deg. C., a shaking device to hold six reaction flasks (250 ml. Erlenmeyer flasks), which are immersed in the bath, and six gas measuring devices or gasometers, which are connected to the reaction flasks by rubber tubing.

A satisfactory medium for the fermentation method is the following:

Solution A, dextrose salt solution.

Monopotassium phosphate	4.0 gm.
Calcium chloride ($2H_20$)	0.5 gm.
Magnesium sulphate ($7H_20$)	5.0 gm.
Ferric chloride soln. (1%)	1.0 ml.
Manganese sulphate soln. (1%)	1.0 ml.
Dextrose (Cerelose)	225. gm.

Tap water, to make one liter.

Fill into small bottles or flasks and sterilize in a boiling water bath for one hour, or use an Arnold sterilizer for one hour.

Solution B, phosphate buffer solution.

Ammonium phosphate, monobasic	60 gm.
Ammonium phosphate, dibasic	36 gm.

Tap water to make one liter.
Sterilize as Under A.

Yeast suspension.

Bakers yeast, 10 gm. or 25 gm.
Tap water to make 100 ml. or 250 ml.
Do not sterilize, of course, and do not use high vitamin B_1 yeast.

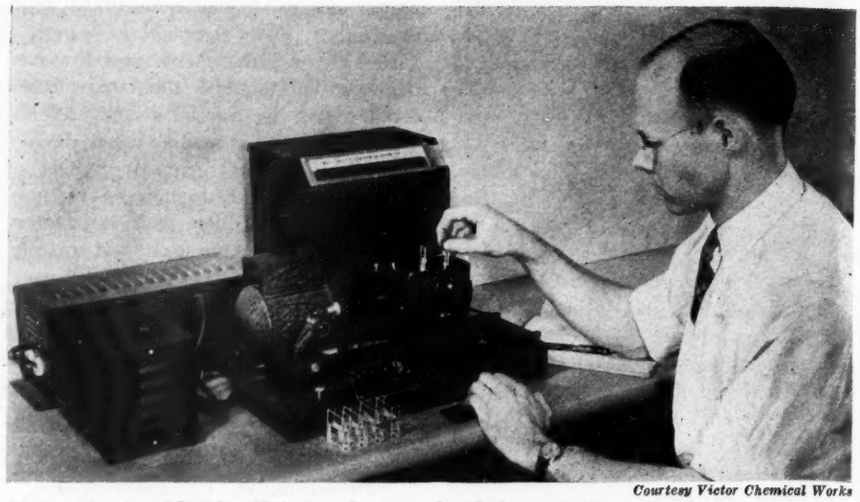
Vitamin solution

Nicotinic acid, 100 mg.
Pyridoxin (B_6) 5 mg. (optional).
Water to make 100 ml.

Standard thiamin solution containing one microgram per ml.

The six fermenting flasks are prepared by adding to each one.
Solution A, 15 ml
Solution B, 15 ml.
Vitamin Soln, 1 ml.

To flasks 1 and 2 are now added 2 and 4 ml., respectively, of the standard thiamin solution. To the remaining four flasks are added 10 or 20 ml. of solution to be assayed. It is a good plan to do these in pairs, using 10 and 20 ml., so that two levels of vitamin concentration will be used, particularly if the sample has not been run before. On more or less routine testing, a single aliquot of unknown may be sufficient. Next add sufficient water so that the final volume after adding the yeast suspension will be 100 ml. Finally add the yeast suspension from a fast-flowing pipet and note the time. Connect the flask to the gas measuring apparatus, place in the shaker in the thermostat, and four minutes after the yeast was added note the zero gas volume. Then record the gas volume every half hour for three hours.



Courtesy Victor Chemical Works

After thiamin chloride (B_1) has been isolated from food products, the amount is measured with a fluorophotometer.

To simplify taking the gas measurements they may be taken on the even half hours and the final three-hour volume arrived at by interpolation. Thus if the volume of gas was 200 ml. at 2:30 P.M. and 260 ml. at 3:00 P.M., while the three-hour period for that particular sample ended at 2:40, the three-hour gas volume was evidently 220 ml. Incidentally the volumes just given are about the order of magnitude to be expected with this method.

The sample for this method is prepared by weighing or measuring it into water made acid to Congo red with sulphuric acid, and steaming for thirty minutes in an Arnold sterilizer, or the equivalent in heat treatment. It is then cooled and made up to 100 ml., and 10 or 20 ml. aliquots used as outlined in the foregoing.

The rate of shaking the fermenting flasks is important. In any case it should be constant. The original article recommends 120 oscillations through a 20 degree arc per minute. No shaking, or periodic shaking, will not suffice; in the former case gas production is very small and with the latter it is quite erratic.

The method is not reproducible as to total gas produced, but the differences due to known amounts of thiamin are constant enough to make it useful as a method of assay. Thus it is necessary to run known amounts of thiamin at two different levels with each series of tests, usually 2 and 4 micrograms as just stated. The difference in gas produced by these two tests gives the gas production equivalent of 2 micrograms of thiamin and the difference between the gas produced by the 10 and 20 ml. samples of unknown is a measure of the amount of thiamin in 10 ml. of sample. In proportion form,

$$\frac{\text{Gas from 4 mcgm. minus gas from 2 mcgm.}}{\text{gas from 20 ml. unknown minus gas from 10 ml. unknown}} = \frac{2 \text{ mcgm.}}{X \text{ mcgm.}}$$

The fermentation method is not specific for thiamin as aminopyridine, nicotinic acid and probably other substances affect it. But frequently these substances can be allowed for or are known to be absent in many foods when the fermentation method, because of its rather simple technic, gives a good indication of the thiamin content of many foods. The method is said to work better on natural than on processed foods, tending to give high results with the latter. About ten unknowns can be run in an eight hour day, if a single flask is used for each one; or five if the unknowns are run in duplicate.

Thiochrome and Colorimetric Methods

If the thiochrome method or one of the colorimetric methods is to be used, the vitamin must be extracted and concentrated and finally obtained in rela-

tively pure solution. The extraction is one of the weak points of the methods. If a simple water extraction will give a clear solution of the solubles, the analyst is fortunate. This is the case with rice polish, wheat germ, flour (more or less) and cereals. Water extraction will remove *added* thiamin from yeast, but not thiamin absorbed by yeast during growth. Digestion with taka-diastase is necessary to insure a complete extraction. With a substance like bread or any kind of baked goods, water extraction yields a starchy solution more or less emulsified with fat that is difficult to do anything with. Furthermore, solution is not complete and consequently the completeness of extraction of the vitamin is seriously in doubt. Hennessey and Cerecedo (1939) recommended a three minute refluxing with 2 percent acetic acid. More recently, tenth normal sulphuric acid has been suggested as extraction medium (Hennessey, 1941). It works very well on bread and baked cereal products, and on yeast, when followed by taka-diastase digestion. Five grams of dry bread of the enriched type is digested 30-40 minutes in 75 ml. of tenth normal sulphuric acid on a boiling water bath with occasional stirring. The digestion mixture is then cooled to 50 deg. C., and 7.5 ml. of 1.2 molal sodium acetate added. This should reduce the acidity to pH 4.0-4.5, but the pH should be checked and adjusted further if necessary as the effect of the sodium acetate depends to some extent on the material being digested. At pH 4.0-4.5, add 0.5 gm. of dry taka-diastase and digest with occasional stirring at 50 deg. for two hours. Then add 10 ml. of tenth normal sulphuric acid, heat to boiling, to stop enzyme action, cool, make up to 100 ml. and filter or centrifuge.

Salivary digestion has also been tried, as well as the addition of papain to the taka-diastase digestion. But the former is inferior to taka-diastase alone, and while papain plus taka-diastase gives a somewhat clearer solution than taka-diastase alone, the thiamin recovery is not improved.

Though digestions of longer than 24 hours have been suggested, the writer would not advise them, as the recovery of thiamin seems to be reduced. If 24 hours is insufficient, better try some other method of extraction. The solution may not be complete, but should be sufficiently so that the residue may be washed thoroughly by centrifuge.

Melnick and Field (1939) recommend 80 percent methyl alcohol, using 15-20 times the sample weight and extracting one-half hour in the cold with constant stirring. For bread crumb (dried), one-half hour is not enough. The following procedure is fairly satisfactory for bread crumb.

Preparing Bread Crumb

Cover 25 gm. of crumb in a 200 ml. tall beaker with 100 ml. of 80 percent methyl alcohol plus one drop of concentrated hydrochloric acid. (Use synthetic methanol 99 percent, and redistill it before using.) Let stand one hour, stirring occasionally, then stir vigorously for one hour with an electric stirrer. Filter (or centrifuge) and wash the crumb with two 10 ml. portions of the 80 percent alcohol. Return crumb to beaker, add 80 ml. of 80 percent methyl alcohol and repeat the extraction process. Finally wash the crumb with sufficient 80 percent methyl alcohol in small portions so that filtrate and washings together amount to 200-250 ml. Evaporate extract in vacuo below 50 deg. C. to about 30 ml. Transfer to a 50 ml. volumetric flask, using warm water (50-60 deg. C.) to rinse the evaporating flask. Cool and make up to volume. Two ml. of this solution represent 1 gm. of bread (dry), or about 4 micrograms of thiamin if the bread is of the enriched type.

During the evaporation in vacuo the solution becomes milky due to the separation of fats and lipids as the alcohol evaporates. This seems to do no harm in the adsorption procedures which follow. A preliminary ether extraction of the crumb reduces but does not entirely prevent it.

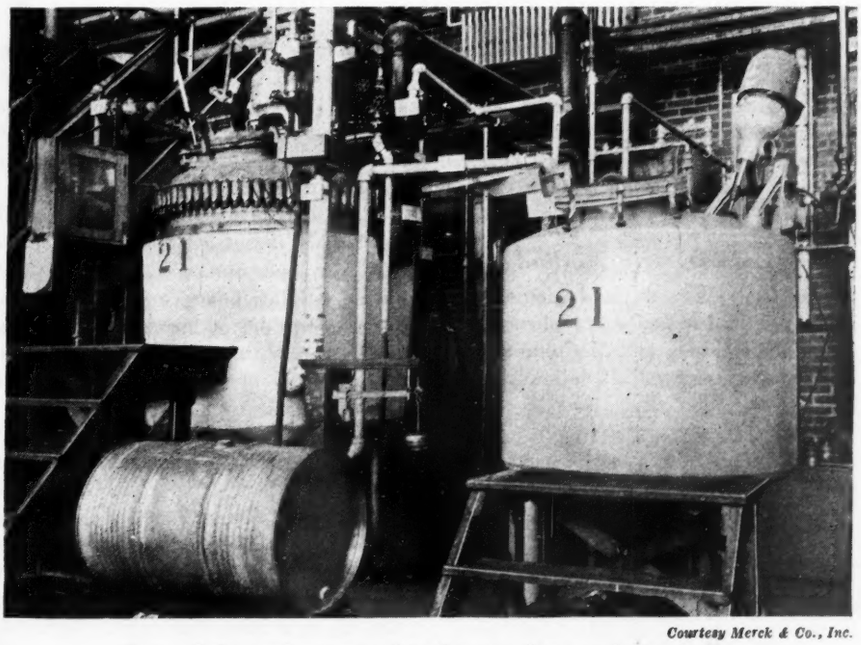
Method of Adsorption

With the thiochrome methods, smaller samples of bread, say 5 gm., can be taken for extraction, and it is necessary to handle only about 100 ml. of solution. With both the thiochrome methods of Hennessey and Cerecedo and the colorimetric method of Melnick and Field, the next step is the adsorption on zeolite. Adsorption or "base exchange" tubes, 6-8 mm. inside diameter and 30 cm. long with a 0.03 mm. outlet, are made up with a filter tube or funnel fused onto one end. A roll of glass wool (Pyrex 790) is placed in the bottom of the tube, then a column of prepared zeolite, (Decalso, 80 mesh, obtained from The Permutit Company, New York) about 65 mm. high. The Decalso is prepared for use by boiling it in 2 percent acetic acid three times, then in 25 percent potassium chloride, then washing free of chloride and drying at 100 deg. C.

An aliquot of the extract containing 5-10 micrograms for the thiochrome method, or 100-150 micrograms for the colorimetric method of Melnick and Field, is filtered through the zeolite column followed with three or more 5-10 ml. portions of distilled water, letting the column drain completely between washings.

After washing is completed, the vitamin is eluted from the zeolite, by passing successive portions of potassium chloride solution (25 percent, about pH 4 with hydrochloric acid) through it, collecting the eluate in a graduated container. For the Melnick and Field colorimetric method, the eluate volume should not exceed 10 ml.; for the thiochrome method up to 25 ml. may be collected.

To get good adsorption, the solution must be free of suspended matter that might clog the zeolite column, moderately acid, about pH 3.0; and the passage should be slow, not over 1 ml. per minute. It is not difficult to get good replication



Courtesy Merck & Co., Inc.

Some of the equipment used in the manufacture of vitamin B_1.

of adsorption by this method. The elution should be leisurely performed. If done slowly, 90-100 micrograms or more can easily be concentrated into 10 ml. of eluate. A 65 mm. column of zeolite 8 mm. in diameter, will hold up about 3 ml. of liquid. If the column is drained as completely as possible of wash water (use suction if necessary), and 3 ml. of potassium chloride added, scarcely any liquid will drain out. After 10-15 minutes, a second 3 ml. of potassium chloride solution is added displacing the first 3 ml. This procedure is repeated with waiting periods of 10-15 minutes between additions, until 10 ml. of eluate is obtained, which will be found to contain all the B_1. If 25 ml. of eluate is required, 5 to 10 ml. portions of potassium chloride may be used.

The remaining steps of the thiochrome procedure consist in oxidizing the thiamin in an aliquot of the eluate with alkaline ferricyanide to thiochrome, extracting the thiochrome from the solution with isobutyl alcohol and measuring the fluorescence of the isobutyl alcohol layer, using one of several fluorescence meters available. These are photoelectric instruments that measure photoelectrically the intensity of the blue fluorescence excited by exposure of the thiochrome solution to ultraviolet light of about 3,600 Ångstrom units wavelength. The procedure is straightforward but attention to detail is important, and the strict routine of timing, shaking, and other operations must be adhered to.

Wang and Harris Method

In the Wang and Harris thiochrome method, adsorption on zeolite is not required. Five to 8 ml. of extract is first extracted with isobutyl alcohol to remove fluorescing non-thiochrome compounds. This alcohol is discarded. Then 1-2 ml. of the extracted aqueous layer is treated with potassium ferricyanide and sodium hydroxide and the thiochrome produced is extracted with isobutyl alcohol. A blank or control without ferricyanide is run alongside the unknown sample. The isobutyl alcohol from unknown and control is dried with sodium sulphate and placed in non-fluorescing test tubes (Pyrex tubes have been found to be non-fluorescing) in front of a source of ultra violet of proper wavelength. The control tube is then titrated with a standard thiochrome solution in isobutyl alcohol until it matches by visual examination the fluorescence of the unknown solution. The unknown is titrated with blank isobutyl alcohol to keep the volumes in the tubes the same, or the comparison may be made on the basis of concentration, without keeping the volumes the same if they are reasonably close, say 10 to 15 ml. The standard thiochrome solution is prepared from pure thiamin put through the same treatment as the unknown and control.

Wang and Harris used glass stoppered cylinders for the ferricyanide oxidation and the isobutyl alcohol extraction. It is better to use 20 ml. centrifuge tubes for these steps, as the isobutyl alcohol layer separates from the aqueous layer very slowly in some cases and in fact may not separate for hours. A minute or two in the centrifuge quickly separates the layers. It is important with the Wang and Harris method to use a strong source of ultra-violet [a 100-watt mercury vapor lamp with a Pyrex Filter No. 597 (Red Purple Ultra) is satisfactory] otherwise with the small amounts of thiamin used in it, the fluorescence may be too weak to match easily. The principle advantage of the method is that it does not require adsorption and elution, and it does not require expensive instruments.

Courtesy Nopco Vitamin Laboratories

Vitamin chemical laboratory for research and control of water-soluble and fat-soluble vitamins.

Colorimetric Method

The Melnick and Field method uses the diazotized p-aminoacetophenone reagent of Prebluda and McCollum. It is very easily prepared, as follows:

Solution A

p-aminoacetophenone (Eastman Kodak Co. #631) 3.18 gm.
Dissolve in 45 ml. conc. hydrochloric acid and make up to 500 ml. with distilled water. The solution is stable for six months or so in glass stoppered bottles away from strong light.

Solution B

Sodium nitrite CP..... 22.5 gm.
Distd. water to make..... 500 ml.
Keep in refrigerator. This solution deteriorates rather rapidly.
Discard it if it begins to fume and give off oxides of nitrogen.

Solution C

Sodium hydroxide CP..... 20 gm.
Sodium bicarbonate CP..... 28.8 gm.
Dissolve in distilled water and make up to 1 liter.

Surround a 150 ml. Erlenmeyer flask with shaved ice in an 800 ml. beaker. Add 15 ml. of solution A and 15 ml. of solution B. Agitate with an electric stirrer for at least 10 minutes (20 minutes is better). Then add 60 ml. of solution B and continue stirring for 20-30 minutes more. Stopper the flask and let it stand in the ice bath for an hour or so. The solution is then at its best. If kept in a refrigerator, it is good for about 24 hours more. Melnick and Field state that it is good for a week, but the writer has found that the color produced by it becomes less intense as the solution grows older. It is so easily made fresh that there is no particular point in trying to preserve it.

To make the final reagent, 25 ml. of the freshly diazotized solution is added to 275 ml. of solution C. A very faint purple coloration appears, which disappears on stirring a few minutes, leaving a colorless solution if the diazotized solution is fresh or faintly yellow if it is older.

To make the thiamin determination, pipet 3 ml. of potassium chloride eluate of the unknown sample into a 20 ml. centrifuge tube, add 3 ml. of 95 percent alcohol (ethyl) containing 5 mg. of phenol per ml. Add a drop of thymol blue indicator and 1 normal sodium hydroxide to a faint blue color. Then add 6 ml. of reagent. Mix contents of tube,

stopper with a cork stopper and let stand overnight at room temperature. On adding the reagent the blue solution changes to a reddish or yellowish brown and on standing a flocculent red precipitate may settle out if the thiamin content of the tube is 30 micrograms or so. After standing overnight, add exactly 2 ml. of xylene to the tube and shake vigorously for 1½ minutes. Centrifuge and compare the color of the xylene layer with standards in a colorimeter.

The 3 ml. of eluate should contain 30–50 micrograms of thiamin hydrochloride. It is advisable to prepare two standards, one above and the other below the unknown, if possible. It is not always safe to assume that the concentrations of thiamin in an unknown and in a single standard are proportional to the readings of a colorimeter scale. If the two standards "bracket" the unknown, interpolation between them is more reliable.

It is necessary to run standards with each set of unknowns as the color produced varies in intensity with the age and condition of the reagent used, hence the colorimeter readings will not agree for the same amount of pure thiamin on different days with a different batch of reagent.

Practice Needed

Melnick and Field in their original paper advise using blank potassium chloride eluate in preparing standards. The writer has never been able to find any difference between straight potassium chloride solution and that filtered through zeolite. A more truly comparative procedure, if one wishes to include the zeolite filtration in the standard is to adsorb a known amount of thiamin, say 100 micrograms, on zeolite, and elute it into 10 ml. of potassium chloride solution, using 3 ml. of the eluate or 30 micrograms as a standard. It is highly advisable for anyone using the zeolite adsorption method to make a number of adsorptions and elutions of known amounts of thiamin and work out the details of the technic until the "recovery" of thiamin is 90 percent or better, before relying on the method.

The color reaction and xylene extraction are clear and straightforward procedures that are highly reproducible in themselves. The difficulties come from the relatively large quantities of thiamin required and the not too satisfactory methods of extraction and concentration. The most satisfactory color range lies between 20 and 60 micrograms of thiamin; above 60 the color is too intense for good colorimeter readings; below 20 it is too faint and stray foreign colors may interfere.

Using Adsorbent Clay

In an effort to avoid the zeolite adsorption, Emmett, Peacock and Brown advocated the use of Superfiltrol (obtained from The Filtrol Company, Los Angeles, Calif.), an adsorbent clay, as adsorbing agent and 95 percent ethyl alcohol as an extracting agent for the color produced. They then used a Lovibond tintometer to measure the amount of red in the alcohol solution. The tintometer is necessary, as the color sometimes has a little yellow in it. The following method gives fairly satisfactory results using a photoelectric colorimeter.

Into three 20 ml. centrifuge tubes marked A, B, C, pipet not more than 15 ml. of solution to be tested. To B and C add respectively 1 and 2 ml. of a solution containing 10 micrograms of pure thiamin per ml. Make all the tubes up to 17 ml. or whatever is the volume of the largest, and add a drop of bromcresol green indicator. Adjust to pH 4.5 with dilute hydrochloric acid, that is to a yellow or sea-green color. Add to each tube 0.10-0.15 gm. of Superfiltrol. Mix well and let stand at least an hour with occasional shaking. Centrifuge and discard centrifugate.

To each tube add 6 ml. of 50 percent ethyl alcohol containing 2.5 mg. phenol per ml. and a drop of thymol blue indicator. Add normal sodium hydroxide to a faint blue (1 or 2 drops). Then add 6 ml. of fresh diazotized p-aminoacetophenone reagent. Mix and let stand at least two hours with occasional mixing of the liquid and Superfiltrol layer. It does no harm to let the tubes stand overnight.

The clay layer will take on a pink to reddish purple color depending on the amount of thiamin present and the supernatant liquid becomes yellowish brown. Centrifuge and discard the centrifugate. Wash clay adsorbate with two 5 ml. portions of distilled water, breaking up the clay with a small glass rod if necessary to get it uniformly suspended. Drain the tubes as dry as possible after each washing. Add 2 ml. of 95 percent ethyl alcohol after the last washing. Mix thoroughly with the clay layer and let stand at least an hour. There should be no clay particles of darker color than the aggregate. Centrifuge and determine color intensity of alcohol solution with a colorimeter, subtracting from the reading the reading given by a blank using distilled water instead of unknown solution. This corrects for accidental color from the clay, or introduced by incomplete washing.

Make a plot using colorimeter readings as ordinates and added thiamin quantities as abscissas. The ordinate for the A tube will have 0 as abscissa. The three points should lie on a straight line. Extend the line backwards till it cuts the axis of abscissas to the left of the origin. The intercept will indicate the amount of thiamin in the sample. By this method, any color extracted, adsorbed and eluted that is not due to the diazotized p-aminoacetophenone reaction, affects each tube the same.

It has been found impossible to get concordant results on bread by comparison of the color of test material with the color of pure thiamin. Direct comparison is quite satisfactory for yeast, however, where water extraction or extraction plus digestion as previously mentioned gives an extract comparatively free from solubles that interfere with the color production. In fact, the original authors of the method claim that for yeast it is not necessary to adsorb on Superfiltrol or on zeolite, but is possible to proceed with the Melnick and Field method without further treatment. With the methyl alcohol extract of bread crumb previously described, adsorption is necessary.

Such are the principal methods of vitamin B_1 determination at this writing. They leave much to be desired as to general applicability and their reliability is none too great. With the increased activity in this field of study that seems bound to be a byproduct of enrichment proposals, more reliable, easier and better applicable methods are certain to follow.

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How To Put Vitamin A Into Foods Made From Flour

Economically possible, though labeling and supply problems are involved. Best practice is to premix carotene in flour; blending of premix with ingredient flour simple

By ELMER F. GLABE, *Food Research Division, Stein, Hall Manufacturing Co., Chicago, Ill.*

ALTHOUGH official rulings on vitamin enrichment of foods thus far apply only to wheat flour and related products, extension of the enrichment program to include foods made from flour is regarded as certain.

When the expected extension is made, amendments to the existing rulings will have to be made if the program is to include vitamin A or its provitamin, carotene.

Specific claims for foods containing vitamin A place this vitamin under the restrictions of the dietary foods ruling recently made by the Food & Drug Administration. The scope of this ruling, of course, embodies a problem entirely divorced from the simple enrichment program now being promoted for the B vitamins in flour and bread. At the present, through a peculiarity of the law, the enrichment of flour-containing foods with vitamin A requires the manufacturer to label his product "artificially colored." This requirement has come about through the interpretation of the law that any material is an artificial product if it has been processed in any manner. Carotene-provitamin A is derived from carrots and other vegetables by concentrating provitamin. In the eyes of the law, this concentration makes the provitamin "an artificial product" even though, without question, it is a natural component of the vegetables from which it is obtained.

Vitamin A enrichment of foods made from flour is economically possible. Such enrichment can be regarded as desirable from the standpoint of health and nutrition and can be recommended to food manufacturers whose products lend themselves to vitamin A enrichment.

In view of the fact that vitamin production, utilization and evaluation are occupying first-place positions of interest throughout the world today, it is difficult to say which of the vitamins is of greatest importance. Each has its particular function in the human body, and medical science is agreed that all of them are necessary in the normal good health and well-being of the human race. An aroused public interest in, and a growing consciousness of, the importance of vitamins has greatly increased the market demand for all vitamins. Vitamin A is having its share of that demand. An important problem to be solved is one of supply.

ELMER F. GLABE

In the case of vitamin A, the discovery of carotene as a provitamin of vitamin A opened up new sources of supply entirely different from the fish livers from which the world's supply was originally obtained. In the human body carotene becomes vitamin A and performs the same function as vitamin A from fish liver oils.

Research workers have been investigating the whole vegetable world in which the presence of carotenoids is indicated. "Green, yellow or orange are the color indicators of potential vitamin A in plants; carotenes always accompany the chlorophyls."[1]

Since carotenoids differ considerably in their composition, there is considerable variation in their provitamin A content. Only four types have been found which will produce vitamin A. Scientists have identified these types as alpha, beta and gamma carotene and cryptoxanthin. The other carotenoids contribute pigment to the plant but are inactive as far as vitamin A is concerned (Table I).

Because beta carotene gives rise to two parts of vitamin A when ingested by human beings, it is the form most used for food enrichment purposes and serves as the basis for the International

Table I—Sources and Vitamin A Relationships of Carotenoids.[1]

Name	Sources	Molecules of vitamin A possible from molecule of pigment
Alpha carotene..	Carrot root; red palm oil	1
Beta carotene...	Carrot root; red palm oil; green leaves; butter	2
Gamma carotene	Lily of the valley leaves, fruit of Dutch East Indies Gonocarym pyriforme plant	1
Cryptoxanthin..	Yellow corn; green grass; egg yolk	1
Xanthophyll....	Green leaves and grass; egg yolk	0
Lycopene.....	Tomato; watermelon	0
Capxanthin.....	Red peppers; paprika; pimento	0
Taraxanthin....	Dandelion; sunflower	0
Vivloxanthin...	Yellow pansy	0
Zeaxanthin.....	Yellow corn; green leaves; egg yolk	0

[1] The Vitamins. Published by American Medical Association, Chicago, Ill., 1939, page 25.

Unit rating for vitamin A; 0.0006 mg. of carotene is equivalent to one International Unit.

Vitamin A and carotene are oil soluble. Both are available in crystal form; carotene is the cheaper form. The vitamin itself and its precursors contain unsaturated bonds, which permit it to oxidize quite readily. Because oxidized vitamin A has no biologic activity, precaution against oxidation must be taken during the handling of this vitamin. Also, it must be protected against the action of light, which destroys its biologic value.

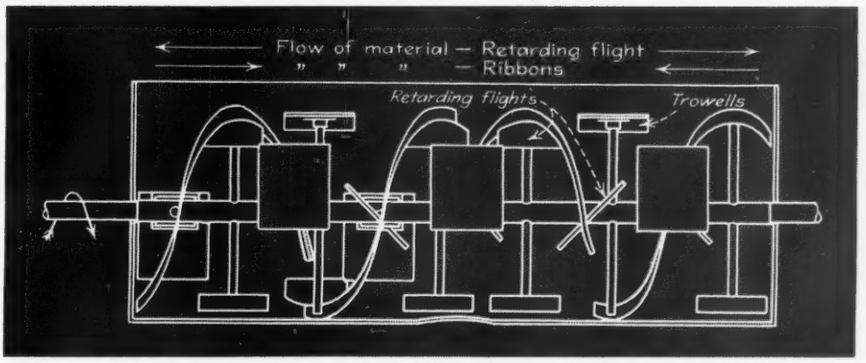
In respect to heat, vitamin A and its carotene precursors are stable at most cooking and baking temperatures, provided care is taken to prevent oxidation. As a result of oxidation during baking, the vitamin A content in the crust of an enriched baked product can be expected to be lower than that of the crumb.

Uniform distribution of carotene through a mix containing flour as a major ingredient presents some difficulties. Since carotene is not water soluble, it cannot be introduced in the water going into a dough batch as is customary with the B vitamins.

The best practice is to premix the carotene in the flour. Even then, assurance of uniform distribution throughout the mix is dependent upon the effectiveness of the mixing or blending equipment used. The mixer or blender should not only be of the type which has a combined pressing and rubbing action, such as is used in making prepared flours containing a fat or shortening ingredient, but should also be of such construction that temperature conditions in the mix may be controlled. A jacketed mixer equipped with a combination spiral ribbon and revolving trowel spreader type of agitator and flight retarding paddles is an example of the type of blender or mixer which gives best results.

Premixes made under controlled mixing and temperature conditions are, thus far, the best agents for adding a carotene-provitamin A content to any food made from flour. They are commercially available in various potencies, and their use is rapidly becoming widespread because they simplify the mixing problem of the average users who do not have the necessary blending equipment to make their own premixes.

Blending of the carotene-containing premix with the ingredient flour in a batch is comparatively simple; particularly when done prior to adding the other ingredients to the flour in the production mixer. Samples of the blend can be drawn off from time to time and examination by the flour slick-test will indicate the uniformity or thoroughness of the blend.



Type of mixer recommended for premixing carotene with flour. It is a broken spiral ribbon mixer with revolving trowel spreaders, flight retarding paddles and middle discharge

Quantitative tests for presence of carotene-provitamin A are made by means of precision instruments which should be operated by thoroughly trained personnel. The spectrophotometer measures comparatively the intensity of ultra violet ray absorption; the fluorophotometer measures the intensity of the fluorescence of materials; and the photoelectric colorimeter measures the intensity of the blue color produced by the Carr-Price antimony chloride reaction.

At best, color can only be regarded as a rough guide to vitamin A content of a material, and then only when the provitamin of the vitamin A is derived entirely from beta carotene.

Purchase of vitamin compounds or carotene-provitamin A premixes, as with other quality-influencing ingredients, should be made from reliable producers equipped with reliable control apparatus when the user cannot afford a well-equipped and reliably staffed laboratory of his own. Even then, frequent rechecks of finished enriched products by independent laboratories are advisable, especially when definite claims for vitamin A potency are made on the label of the packaged product.

Courtesy Nopco Vitamin Laboratories

Using the spectrophotometer in vitamin A determinations.

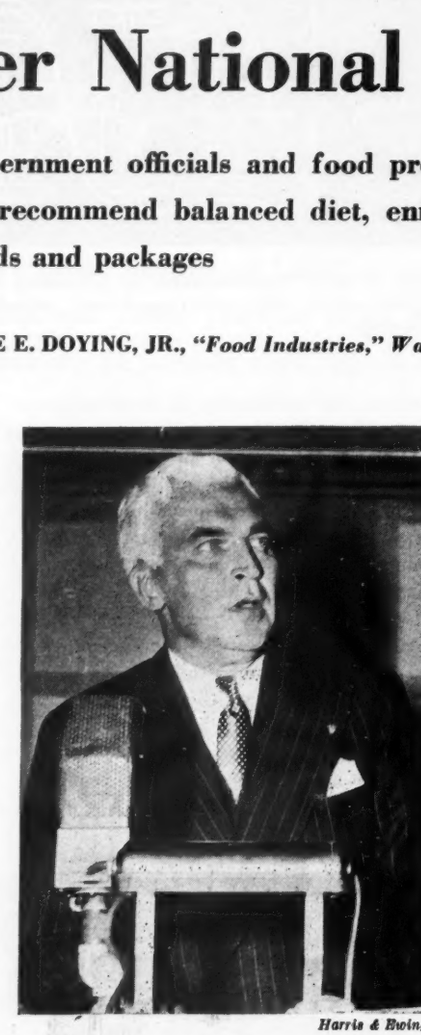
Conference Sets Course To Better National Nutrition

Health authorities, government officials and food processors outline program. See no short-cut, but recommend balanced diet, enrichment of few common foods and low-cost foods and packages

By GEORGE E. DOYING, JR., *"Food Industries," Washington, D. C.*

THERE is no short-cut to sound nutrition, no food fad-ism and no capsule cure. Good nutrition, stripped of all its scientific terms, consists simply of eating enough of the right, common, everyday foods, properly prepared. Practically speaking, these "right" foods are today available in ample quantities, or can be made so as the demand is generated, and the quality of their preparation for the home is keeping abreast of the times.

Above all other matters, this somewhat unpretentious lesson is the lesson which grew out of the National Defense Nutrition Conference held in Washington, May 26–28. This lesson is perhaps not as dramatic as would have been the agreement upon some "all-purpose" food; there is in it no element of searching out a "scapegoat"—processors, distributors or some one—upon whom to pin blame for the malnutrition that exists in America today. Instead, the tenor of the conference was focused upon the infinitely more complicated job of bringing home to every family the unadorned truth that appetizing meals, selected from a wide variety of foods to suit individual tastes, provide the nourishment which scientific knowledge has shown to be needed.



Harris & Ewing

Paul V. McNutt tells the nation and those attending the National Nutrition Conference that good food "loses its gastronomic gusto . . . when its selection is distilled through the coils of an expert."

Recommended Diets

The conference was started out in this direction by a pre-session national radio broadcast in which the Food and Nutrition Committee of the National Research Council announced a detailed chart of recommended daily allowances of specific nutrients for a number of classes of individuals. With this chart as the guide, the job of the conference was one of "translating these allowances, and other similar technical material, into terms of everyday foods and appetizing meals suitable for families and individuals at different economic levels in such a way that the newer knowledge of nutrition can be applied simply and practically in every home, and in accordance with the food preference of the family." A start toward this goal was furnished by the committee in the form of a daily diet which measures up to the detailed allowances: One pint of milk for an adult and more for a child: a serving of meat (and cheaper cuts are just as nutritious); one egg or suitable substitute; two vegetables, one of which should be green or yellow; two fruits, one rich in vitamin C (citrus or tomatoes); breads, flour and cereal, most or all whole-grain or enriched; butter or oleomargarine with vitamin A added; other foods to satisfy the appetite.

Two cues provided in the committee's report were stressed again and again during the sessions. Cheaper foods, such as inexpensive meat cuts and oleomargarine, are just as satisfying from the nutrition standpoint, thus minimizing the problem of getting proper nutrition to all but the lowest income families. Federal Security Administrator McNutt, in opening the conference, touched upon this with some straight talk to both the food industry and "the experts." The food industry he criticized for "over-selective" distribution and advertising directed to the 30 percent with plenty of money; the "experts he chided for forgetting the very point advertisers remember, that eating ought to be fun and that good food "loses its gastronomic gusto . . . when its selection is distilled through the coils of an expert."

Urge Restricted Enrichment

The other cue from the committee's report which threaded through the conference sessions was the conclusion that fortification, restoration and enrichment should be recommended as a device to be used only when absolutely necessary, then only under the direction of nutritionists and doctors. "Enriched" flour and bread repeatedly were cited as perfect examples of the few cases when synthetic enrichment is necessary, a recognition of the truth, which the nutritional purists would not recognize, that Americans on the whole just won't eat anything but white bread. The consensus was that the nutrition program must not disturb eating habits and preferences.

Three of the sections into which the conference divided up for most of the spade-work which went into the final general report for presentation to the President (this report is printed, somewhat abridged in text elsewhere on these pages) dealt with problems of interest to food processors. A brief discussion of their conclusions appears appropriate.

Section 1 was assigned the problems of national nutrition research and dealt with all the prinicipal lines of inquiry in the

nutrition field with the objective of clarifying problems which most urgently need further immediate study. It was agreed that present-day knowledge, while still incomplete, is sufficiently extensive to permit formulation of adequate dietaries at several cost levels; for recognizing several specific types of malnutrition; for conserving nutrients in foods; and, with some vitamins, for utilization of synthetic products to supplement deficiencies.

The Section specifically recommended, among other things, that further research be undertaken to improve presently known chemical and biological procedures for estimating the amounts of essential nutrients in foods and their physiological availability; to study all factors affecting the nutritive value of foods for consumption so as to avoid losses of nutrients; and to study food habits and methods and effects of changing them.

Consumer Viewpoint

Section 2, assigned the subject, "Economic Policy and Social Responsibility as Related to Nutrition," rather naturally took a militant consumer viewpoint in its report. The group called for various efforts to increase purchasing power of low-income families, then turned to proposals for increasing supplies of protective foods and reducing distribution and processing costs. Subsidizing of consumption or production were considered probably necessary in some cases, and the group added the recommendation that government take the initiative in encouraging industry to bring on the market low-cost, nutritious foods in acceptable form—such as soybeans, peanuts and milk products.

Extension of grade labeling and revision of Federal grades of fresh fruits and vegetables to reflect differentials in nutritive values were suggested, as well as simplification of sizes and shapes of containers and provision for more information in advertising to facilitate identification and comparison of quality and quantity. The group also listed several generalities that distribution and marketing methods should be improved to reduce consumer prices, and recommended specific legislation to end such discriminatory laws as oleomargarine taxes, unfair sales laws which encourage price-fixing, state marketing and prorata acts, etc. Support of cooperatives was approved, as was increased Federal distribution of essential foods through school lunches, stamp plans and the like.

The third group which touched upon processor and distributor problems, Section 7, acted on the subject, "Nutrition Problems in Distribution and Processing of Foods." "The first essential for a well-fed nation is a supply of food large enough to give everyone an adequate diet," this group reported. "A second essential to improve nutrition among low-income families is greater efficiency in the transportation, processing and distribution of food products."

Advise Agricultural Adjustment

For the first "essential," the group recognized the need to adjust agricultural production and to insure fair prices and fair incomes to farmers during adjustments away from crops normally grown for the export market. For the second, the group reported that the food industry "has already made much progress" and urged further development of economical retailing adapted to low-income consumer requirements, improvements in terminal market facilities, cheaper food forms and the most economical packaging.

"In some cases," this report said, "such a program might require public planning and possible public financing of certain facilities."

This group, too, recognized "bottlenecks" which contribute to keeping food prices and margins higher than they need be, and called for enforcement of antitrust laws to break monopoly, racketeering and illegal practices wherever they are found—agriculture, industry or labor

Wide World Photo

That there is no short-cut to sound nutrition is exemplified by this exhibit at the National Nutrition Conference, arranged by the U. S. Chamber of Commerce. A well-balanced diet of fruits, vegetables, meat, eggs and dairy products is shown, enough for a family of four for one week.

—and for elimination of municipal, state and Federal legislation not designed wholly to protect health of consumers or public welfare. Another recommendation was that the National Selective Service system be requested to recommend to local boards deferment of those "technically trained men who are essential in the production of processed foods, that OPM give effective priority to the processing industry for material and supplies and that the Maritime Commission and the Defense Transportation Division see to it that adequate facilities are made available for shipments of food supplies.

In all three reports above discussed, and in all the others, one single point was stressed—education. All sides agreed that the front-line job is primarily one of slugging away constantly at the same simple story, using all the facilities for reaching public opinion that are available.

And so, where do we go from here?

The conference ended upon Mrs. Roosevelt's urging that the 900 delegates present go back home to "whoop it up" in their local communities. Conference officials, from Director M. L. Wilson of the Department of Agriculture Extension Service on down, hope to see each of the groups represented at the Washington sessions take back to their colleagues the question: What can we do to help carry the general program into effect?

Only maximum participation by all organized groups in carrying the lessons of the conference to individual families "back home" will keep the ball rolling, in Director Wilson's opinion. There is to be no dramatic Federal program coming out of Washington to do the job. Piecemeal shaping of various governmental policies will stem from this "general charter," as the report to the President is being called, but no great new Federal "experiment." Such activities as the surplus food distribution program will feel the effects of the various reports urging utilization of this function of government to spread nutritional foods to the lowest income families.

Also to be affected will be the various government relief and security programs, whose future growth and policy will be materially shaped to fit recommendations from the conference. So too will farm programs, to facilitate and accelerate the shift in emphasis in agriculture from crops with dwindling futures to the more nourishing foods.

This is a long-term program which has been launched. The conference was called as a national defense nutrition conference, and while its immediate objective dealt with this phase of the subject, it was recognized in every meeting and by every speaker that whatever is

started now will be primarily the foundation for a permanent campaign which will last long beyond the emergency.

Recommendations of Conference To President of United States

I. The great and sometimes startling advances in our knowledge of nutrition in recent years have made it clear that the food an individual eats fundamentally affects his health, strength, stamina, nervous condition, morale and mental functioning. In view of these proven facts, it is vital for the United States to make immediate and full use of the newer knowledge of nutrition in the present national emergency. To neglect this aspect of defense would be as hazardous as to neglect military preparedness.

II. The newer knowledge of nutrition should be used not only for the benefit of our armed forces, who must, of course, be adequately fed, but for that of all workers in industries directly and indirectly related to defense and also for the civilian population as a whole.

III. Recent dietary studies among large representative samples of the people of the United States, clinical studies among smaller groups and the examination of men called up for military service show clearly that poor diets and undernourishment are widespread in this country. The conditions revealed corroborate the scientific findings of the newer knowledge of nutrition. While these conditions offer no ground for alarmist statements, they are serious enough to be a genuine cause of weakness in the present national emergency and to warrant national attention and concerted action . . .

IV. Few problems in the field of public health are simple, and that of undernourishment is particularly complex. It has not only medical but social, economic and psychological aspects, and to attack it on a national scale will require peculiarly widespread and whole-hearted cooperation on the part of all elements in our population. This Conference urges the following lines of attack as particularly important:

1. The use of the recommended allowances of calories, protein, and certain important minerals and vitamins, prepared by the Committee on Food and Nutrition of the National Research Council, both as the general goal for good nutrition in the United States and as the yardstick by which to measure progress toward that goal . . .

2. Translation of these allowances, and other similar technical material, into terms of everyday foods and appetizing meals suitable for families and individuals at different economic levels in such a way that the newer knowledge of nutrition can be applied simply and practically, in every home, and in accordance with the food preferences of the family.

3. Vigorous and continuous research to add to our present knowledge of the nutritional needs of individuals, the nutritional status of groups in the population, the nutritive content of everyday foods and the effects of various methods and processing, storing and cooking on their nutritive value.

4. More widespread education of doctors, dentists, social-service workers, teachers and other professional workers in the newer knowledge of nutrition. At present this knowledge, especially in its practical applications, is familiar to far too small a group even in the professional field.

5. The mobilization of every educational method to spread the newer knowledge of nutrition among laymen by means of the schools, motion pictures, the radio, the public press, home and community demonstrations and all other suitable means.

6. Mobilization of all neighborhood, community, state and National organizations and services that can contribute in any way to raising the nutritional level of the people of the United States. Many existing organizations are available for this purpose. How they can be mobilized to cooperate most effectively will depend on local situations. The State Nutrition Committees can perform an especially useful function in organizing this effort.

7. Vigorous and continued attack on the fundamental problems of unemployment, insecure employment and rates of pay inadequate to maintain an American standard of living. It has been abundantly proved in many cases that undernourishment and ignorance are twins born of the some mother—poverty. The newer knowledge of nutrition should be a powerful stimulus to greater effort to alleviate and eventually eliminate poverty.

8. Full use of any practical devices, such as the so-called "stamp plan," free school lunches and low-cost milk distribution which will bring nourishment, adequate meals to those who could not otherwise afford them, and at the same time help to distribute food surpluses at a fair return to the farmer.

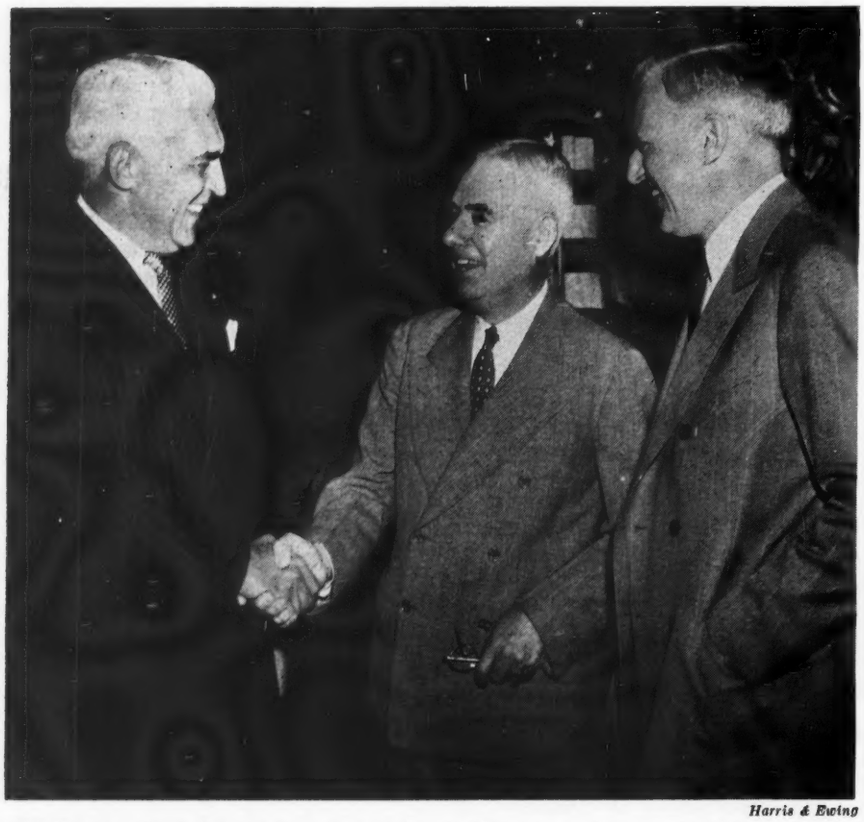
9. Efforts to improve food distribution, including processing, marketing, packaging and labeling, to bring about greater real economies for the consumer. These efforts would include vigorous prosecution of illegal practices under the antitrust laws and the laws relating to unfair trade practices wherever such practices result in unjustifiable increases in food prices.

10. Encouragement in all practical ways of greater production by agriculture of the foods needed in more abundance, according to the newer knowledge of nutrition, in the average American diet. These foods include milk and milk products, eggs, vegetables, fruits and, in the case of many families, lean meats.

11. Equally, encouragement in every practical way of more production for home use by rural people, especially those at low income levels . . .

12. The "enrichment" of certain staple food products, such as flour and bread, with nutritive elements that have been removed from them by modern milling and refining processes. Pending further developments in the milling of grains so as to retain their full, natural nutritive values, enrichment is an economical way to improve American dietaries almost universally, without interfering with deeply ingrained food habits. The method, however, should be used with discretion and only on the basis of findings by medical and nutritional experts.

V. These broad recommendations are made as the basis for a national nutrition policy and an action program that can reach down to every community, and if possible every individual, in the land in the present emergency. But the Conference also wishes to put on record its belief that such a policy and program have implications that go beyond the present emergency . . .



Harris & Ewing

Principals in the national drive for sound nutrition get together at the National Nutrition Conference. They are Paul V. McNutt, left; M. L. Wilson, center; and Russell M. Wilder, right.

New Packages & Products

Bread Doubles As Pudding

AFTER 16 MONTHS TESTING by both sales outlets and housewives, Dromedary Orange-Nut Bread in cans, ready-to-serve, is being marketed nationally by Hills Brothers Co., New York. The new product which "doubles" as a hot pudding, was developed by Hills after the success of Dromedary Date-Nut bread.

Orange-Nut bread, baked from a home-type recipe, comes in 8 oz. loaves packed in round cans equipped with key openers. A special process is used to keep the bread moist and fresh even after removal from the can. The back of the label, designed for easy removal from the tin, has directions for special sandwiches and recipes for sauces to use when the bread is used as a pudding.

Chili Con Carne Concentrate

CONCENTRATED CHILI CON CARNE is appearing on the nation's food counters, under the label of Weisel and Co., Milwaukee, Wis. The dried product, inspected and passed by the U. S. Department of Agriculture, is packaged in 1-lb. lots in amber transparent-cellulose casing.

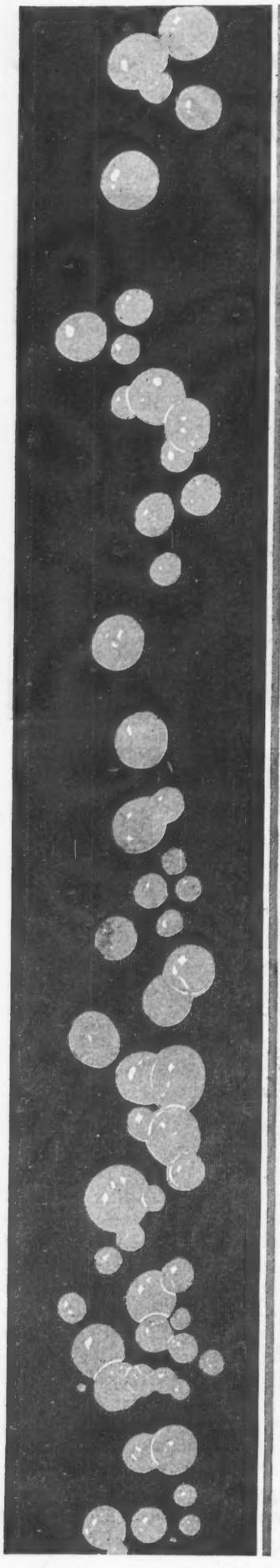
The 1-lb. concentrate, to which 2 cups of water is added to give consistency, is boiled slowly at low heat until dissolved. When one 16-oz. can of red kidney beans is added, the mixture will make 3-lb. of chili con carne.

Apple-Raspberry Juice

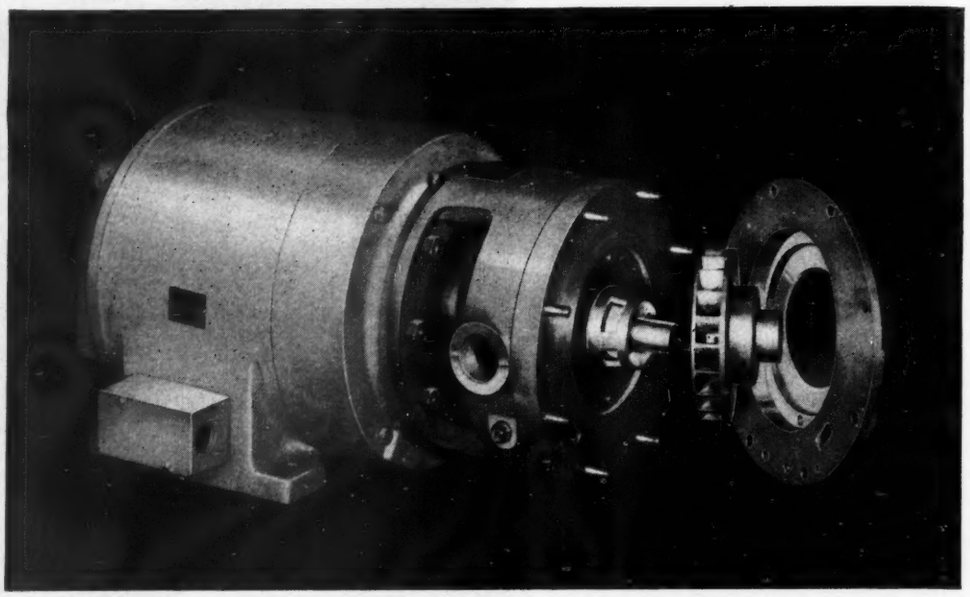
A FORMULA for apple-raspberry juice, a blend of Baldwin, Northern Spy and Cortland apples with Black Bristol and purple raspberry pomace, has been developed by New York State Agricultural Experiment Station at Geneva, which last year perfected cherry cocktail. The state scientists, working to combine two flavors and still obtain intense flavor and color, have produced a blend said to have character, and in which the cost of the basic fruits is not prohibitive.

The black and tart purple raspberries are frozen during the fruiting season with 10 percent of added sugar, and held in storage until the apples are ready to press. The pomace is then extracted at 145 deg. F. with equal quantities of apple juice, and pressed again. The berry juices are added to the apple juice as soon after pressing as possible in order to reduce oxidation to a minimum. The blend is strained, dearated at 12- to 14-cm. mercury pressure, flash pasteurized at 170 deg. F., and packed in cans lined with fruit-juice enamel. The cans are No. 2 tall 20-oz.

The product, favorably received by consumers when tested, fills the real need of an outlet for these fruits.



ONLY CLEAN AIR CAN REACH YOUR PRODUCT FROM A NASH COMPRESSOR



Here is a compressor designed perfectly to meet the needs of the Food Plants. It is simple, for it has only one moving part, a rotor cast in one piece and rotating in the casing without metallic contact. This means trouble-free operation over long periods. It is compact and requires little valuable floor space. Its oversize ball bearings seldom require attention or lubrication. No lubrication is required in the interior, so that the air is kept clean from the time it enters the pump. • But this is not all. The compressing medium in the Nash Pump is a rotating column of clean water. The air is in intimate contact with this water in passing thru the pump and is actually scrubbed while it is being compressed. Dust present in the atmosphere is removed, and the air delivered free from dirt, oil, or heat, without the use of scrubbers or air washers. Think what this means in terms of purchase cost and floor space occupied by complicated air washing apparatus. • These pumps are proving their worth in the most trying service. They are ideal for transferring beer or wort from tank to tank by air pressure, for maintaining pressure on aging tanks, for supplying compressed air to bottling machines in racking, etc. • Available in any capacity, these pumps deliver pressures up to 40 lbs. absolutely uniform without storage tanks. • You want the most reliable pumping equipment in your plant, so by all means find out more about the Hytor. Our catalog No. 217 is free on request.

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The Food Industry News

GENERAL NEWS, BUSINESS TRENDS, MEN, JOBS AND COMPANIES • JULY, 1941

Food Price Fixing Expected As Move to Check Inflation

Ceiling prices somewhat below current prices may be imposed by OPACS. Other agencies also watch food-price trend

It is expected in Washington that OPACS will propose ceiling prices on various food commodities from time to time. Such actions will be taken with respect to goods on which the government thinks that advances in retail price threaten to speed up the inflationary spiral. And Administrator Henderson's office frankly admits that on certain goods (presumably also on foods) ceiling prices somewhat below current levels are likely to be imposed.

When such actions are taken the burden of proof falls on industry to defend increases or to justify changes from schedules fixed by OPACS.

Purchasing agencies of the government are also working along parallel lines in the effort to restrain food-price increases. In a number of cases the government has rejected all bids for wanted goods on the ground that the offerings were at too high a price. One of the most conspicuous cases was the rejection of bids for 11 million pounds of coffee wanted by the Army. Officials claim that a spread of from 2 to 3½ cents a pound above import levels was "unwarranted."

The price section of OPACS has also been working with the wholesale trade groups, as reported last month. Agreements have been reached which it is hoped will prevent speculative advances in the price of pepper, cocoa and coffee. Active collaboration of the exchange officials is tending definitely to stabilize prices by restriction on futures tradings. Higher deposits on margin accounts are to be required in each case.

Despite all these strenuous, and sincere, efforts in Washington, there appears to be little doubt among officials that the cost of living is going to continue its advance. The hope, therefore, is to keep the brakes on as much as possible without causing too great need for complete official control. But privately, government people do not hesitate to say that the present systems of voluntary price control are bound to break down sooner or later, and official price fixing of a mandatory sort will then be the only alternative to inflation.

Overtime Exemption Granted to Canners

Barrier to government contracts removed for many packers of fruits and vegetables

The Secretary of Labor has ruled that canners of fruits and vegetables should be exempt from the provisions of the Public Contracts Act with respect to practically all fruits and vegetables which are canned for purchase by the government. This means that the very heavy burden of overtime pay which previously greatly increased the cost in busy seasons is partially eliminated. It will no longer be impossible for canners working in a normal way under the Wage-Hour law to sell the goods so packed to the government. Formerly many such goods were not eligible for government purchase.

The exemption from the drastic rules of the Walsh-Healey law was granted at the request of the Secretary of War. The action was also taken with the approval of AFL and CIO leaders. Thus, the industry problem has been solved in a way very satisfactory to both canners and cannery workers, as well as to the benefit of the Army.

It is contemplated that a joint committee will carry on further investigations to determine whether this exemption should be extended beyond the limit at present set for December 31.

Softens Claim for Gelatin

The manufacturers of Knox Gelatin have informally advised the Food & Drug Administration that the label claims for relieving fatigue will be removed from packages of their product. This is the result of the seizure reported last month (Food Industries, June, page 85).

British-Combine

LORD WOOLTON INSPECTS FOOD FROM AMERICA

Britain's Minister of Food and Mr. Harriman, President Roosevelt's special envoy, welcome the arrival of the first American food ship sent to Britain under the Lease-Lend Act. Lord Woolton inspects a "strictly fresh laid" egg from the Mid West.

Arnold Speeds Food Industry Indictments in Price Purge

New cases are being prepared throughout country, and many more indictments are predicted for the near future

APPOINTMENT of Attorney General Jackson to the Supreme Court during June cannot be expected to have any effect upon the Department of Justice antitrust campaign in the food field. This is Thurman Arnold's show and it is not likely to be interrupted or interfered with by the change at the top.

The Antitrust Division is readying a number of new cases against processors and distributors in various sections of the country, and indictments may be expected to develop at irregular intervals all summer. Latest and most spectacular in the series of Federal indictments are those returned by two San Francisco grand jurys, accusing five major California food industries of price fixing and other antitrust violations. The mass indictments named 194 corporations and individuals in major companies of fruit and vegetable canning, dried fruit, evaporated milk, rice and sardine industries.

The drive, described by Department of Justice authorities as a move "to increase the price to growers and decrease the cost of food to consumers, by eliminating unnecessary and costly methods of processing and distribution," has called to account 14 associations, 89 corporations and 91 executives of major packing firms, who face fines up to $5,000 each.

Several of the companies indicted on antitrust violation, including the Canners League of California, have issued statements specifically denying the charge.

Thurman Arnold, in San Francisco when the indictments were returned, has issued a statement that 40 more such indictments against monopolistic practices in the food industries are probable in the near future.

Stamp Purchases Pass Ten Million Dollar Mark

THE FOOD STAMP program passed the $10,000,000 monthly volume mark in May, preliminary figures of the Department of Agriculture show. The number of families participating passed the four million level in the same month. Both the number of families and the volume of sales continues to expand despite the slackening of the number of families eligible due to the more rapid expansion of the areas in which the plan is available.

Gross figures for surplus food distribution (stamps and direct relief) in the period from July 1, 1940, to April 30, 1941, include 33,807,000 lb. of butter (now off the stamp plan list); 84,933,000 doz. eggs; 39,075,000 lb. of evaporated milk and 6,472,000 lb. of dry skim milk; 4,312,000 lb. of cheese; 610,756,000 lb. of flour; 418,998,000 lb. of other cereals; 138,039,000 lb. of pork lard and 190,379,000 lb. of pork meat.

Cherry Packers Denied Use of Learners' Permits

No learners' certificates will be allowed on the cherry packing industry in the Northwest. Application for these certificates was denied on June 13 by the Wage and Hour Division of the Department of Labor.

The government decided that since the season lasts but three to four weeks, and since the seasonal exemption from the hours requirements provided in the Fair Labor Standards Act eliminates the problem of overtime pay, learners' certificates are not necessary. It was further stated that the packing of cherries is a relatively unskilled operation, requiring, at the most, a very short training period.

Standard Food Packages, Proposed by Conference

STANDARDS for food packages were proposed at the 31st National Conference on Weights and Measures held in Washington on June 5. This conference was sponsored by the National Bureau of Standards of the Department of Commerce.

The committee on standards and specifications for the proper method of sale and merchandising of commodities made these recommendations: Meat and meat products shall be sold be net weight only, as shall dried fish and fish products. In both cases, it shall be permitted to print the tare weight on the package with a conspicuous statement on each wrapper or container to the effect that the retailer must reweigh the package to ascertain the actual net weight at the time of sale to the consumer. But the preferred practice is to mark the net contents on the package

Flour shall be sold by net weight and flour containers larger than 1 lb. shall be 2, 5, 10, 25, 50, 100 lb., etc.

Tea shall be sold by net weight. When sold in the form of tea balls or bags, it may be sold by numerical count, provided that the net weight shall also be conspicuously indicated on the container. Further, it shall be sold in the following numerical count only: 10, 15, 20, 25, 50, 100 and multiples of 100.

Cheese and cheese products shall be sold by net weight.

A food package standardization bill proposed by the conference classifies all packages of food as "dry or solid foods," "liquid food" and "canned food."

The proposed standard packages for dry and solid foods are: 1, 2, 4, 8 and 12 oz., 1 and 1½ lb. and multiples of 1 lb.

The proposed standard packages for liquid foods and for canned foods are: 1, 2, 4, 8 and 12 oz., 1 and 1½ pints, 1 quart, 3 pints, 2 quarts, 3 quarts, 1 gal. and multiples of 1 gallon.

OPACS Requests Bakers Not To Increase Prices

LEADING bakeries have been asked to refrain from advancing bread prices without prior consultation with the Office of Price Administration and Civilian Supply. This request was made on June 17 in a letter from Administrator Leon Henderson.

"In our policy of stabilizing prices, we consider bread of special importance, owing to its prominence in the diets of all members of the community, and the significance of bread prices as a symbol of the cost of living," the letter stated.

The request was also made that there be no change in "volume discount, cash discount, credit practices, stale-bread return allowances or other trade or price practices or alteration of bread formulas that would have the effect of increasing net manufacturers prices."

This letter was mailed to several hundred bakers.

Food Storage Tunnel To Be Built in Hawaii

THE ARMY will begin construction this summer of a huge food storage tunnel on Oahu Island in the Hawaiian Islands. Costing an estimated $750,000, the tunnel will be 600 ft. long and will have a storage capacity of at least 15,000 tons of food, mostly rice and similar products of the island diet.

Equipped with its own power plant and water supply system, the tunnel will be available as an emergency air raid shelter if need should arise.

Buying for Britain Continues Fast Pace

June orders include fish, eggs, tomatoes and vitamin A

PURCHASES by Surplus Marketing Administration for British account under the lend-lease program and for domestic relief distribution continue at the pace established this spring. Dollar value of purchases and breakdown of commodities for SMA's various activities is still not being announced, although admittedly the bulk of the buying is for lend-lease and all of this is going to Britain.

During June, SMA entered the futures market for both canned fish and canned tomatoes. In the first half of the month, purchases totaled 692,000 cases of the former and 1,553,040 cases of the latter, in addition to purchases of spots for immediate use. Large purchases also are being made regularly of frozen eggs, which SMA distributes to dehydrators for drying. Also in June, SMA made an initial purchase of vitamin A in fish liver concentrate form. The first "buy" was 795,733 million units, all understood to be for British account.

Banana Handling Improved

IMPROVED methods of conveying and classifying bananas have been installed at the Seattle Plant of the Pacific Fruit and Produce Co. A new type of overhead banana conveyor (Mathews) of the continuous flow push type is used to convey the fruit to and from the nine storage rooms in the plant, and to the cutting table.

The cutting table iself is an innovation, being a three-tier revolving table with canvas covering a steel framework. The worker cuts and trims the fruit without removing the stem from the conveyor, and places it according to grade classification on a designated tier of the table.

In addition to being more rapid and efficient, these new methods reduce handling of the fruit by hand to a minimum.

Soybeans Claim Vitamin B_1

RECENT tests prove that the soybean ranks high in vitamin B_1 and the vitamin B complex in general, according to an announcement by Soy Flour Association, Chicago. In fact, the soybean exceeds the vitamin B_1 of meats in general, it is reported. Soy flours assayed between 1,030 and 2,019 I.U. of vitamin B_1 per pound.

Demands of Defense Create Problems for Candy Industry

Labor turnover serious. Transportation, priorities, ingredient prices and shortages are also causes for some concern

PROBLEMS growing out of the national defense program, most pressing of which is the labor situation, were analyzed at the convention of National Confectioners Association, Chicago, June 2 to 5.

Labor turnovers as high as 80 percent in one week, with a very uncertain average of 25 to 40 percent, were reported from various geographical areas, depending upon amount and nature of direct national defense work under way and level of wages being paid.

Paul Mertz, in charge of training within industry for OPM in Chicago, advised the adoption of a five-point program to meet the possibility of a labor shortage problem:

1. Readjustment of labor personnel standards by employers to utilize people heretofore rejected as undesirable.

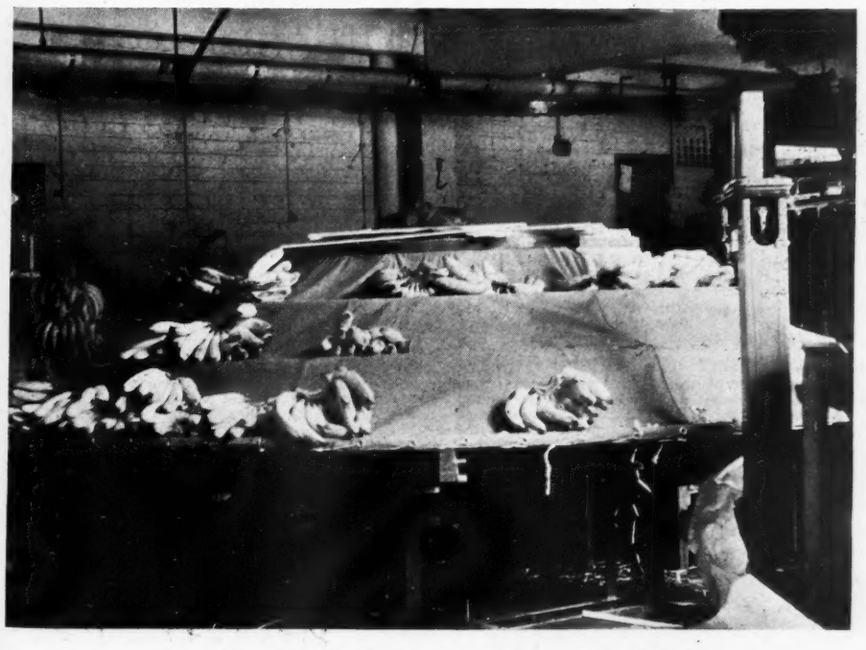
2. Action by employers to stimulate prospective employee interest and to become acquainted with such sources of labor supply as schools and colleges, NYA, CCC and, in some instances, PWA.

3. Establishment of organized training courses and schools for new employees.

4. Reduction of turnover by making jobs and working conditions more attractive.

5. Review of payroll ratings to assure wage return in line with individual employee productivity.

Transportation difficulties, priorities on construction materials, inability to obtain constituent intermediates and reluctance of purchasers to make commitments were cited as being of more significance in the commodity supply program than the existence of the raw materials themselves. Price advances can be definitely expected as a result of advancing costs, but skyrocketing is held to be highly un-



Revolving cutting table for bananas (see item above).

New banana conveyor.

likely. Where possible, domestic production of heretofore imported materials is getting under way, particularly in respect to flavors and flavoring materials.

Ody H. Lamborn, Lamborn & Co., Inc., stated that price levels to meet increased costs is more of a question in respect to sugar than is physical possession.

Increased domestic market demand for peanuts, uncertain crop conditions for domestic almonds, walnuts, pecans and filberts, with shortage of shipping facilities for imported almonds, cashews and Brazil nuts, were cited by Harold J. Clay, Associate Marketing Specialist, Department of Agriculture, as factors affecting supply of nuts for confectionery making.

H. Russell Burbank, vice-president of Rockwood & Co., Brooklyn, N. Y., listed shortage of transportation facilities, tariff and import regulations, and Western Hemisphere crop conditions as factors in making supply of cocoa beans unpredictable and prices higher.

Walter Page, Dairy Consultant, predicted a sellers' market for dairy products, particularly for dried and condensed milks, because of governmental demands for feeding American military and naval forces and for feeding the British populace.

George M. Moffett, President, Corn Products Refining Co., could foresee no difficulty in the corn products industry in connection with supplying all the needed starch and starch derivatives.

AGAIN HEADS NCA

At the annual convention last month, National Confectioners Association reelected Philip P. Gott president. Vice-presidents, also reelected, are S. W. Halstrom, Walter H. Johnson Co., Chicago; and Harry L. Brown, Brown and Haley, Tacoma, Wash. A new secretary-treasurer was elected, Arthur L. Stang, Cracker Jack Co., Chicago.

Confectionery as an item in the Army ration and the need for a candy which will withstand extreme temperature changes and weather conditions were discussed by Capt. C. G. Herman, Subsistence Research Laboratories Quartermaster Corps Depot, Chicago.

Court Orders Condensed Milk Standard Reopened

Objects to sweetener provisions from viewpoint of consumer

THE sweetener controversy between A. E. Staley Manufacturing Co. and the Food and Drug Administration over the use of corn sirup in sweetened condensed milk entered a new phase during June. The U. S. Circuit Court of Appeals in New York ordered that the case be reconsidered by the Federal Security Agency, with the comment "we think that unless a specific finding is made with reference to corn sirup or an exclusive finding made with reference to refined sugar and corn sugar, the interests of consumers have not been given that consideration which Congress had in view."

The Food and Drug Administration has requested the Court to grant another hearing on the case. If this is not granted, the sweetened condensed milk docket will probably be reopened for public hearing to consider the sweetening agent problem again.

Bread Hearing Date Set; Final Oleo Order Issued

BREAD AND ROLLS or buns will be the subject discussed at the next food standards hearing beginning July 7, the first new docket announced since January.

Schedule of Current Action on Food Standards

(Dockets 1 to 11, 13 to 20, and 22 have been completed and dropped from this table)*

	Docket number and commodity	Type of standard or regulations	Presiding Officer	A First announced in *Fed. Register*	B Initial hearing date	C Preliminary briefs due not later than	D Tentative order published in *Fed. Register*	E Final order published in *Fed. Register*	F Effective date of order
12	Cream cheese	Identity	W. G. Green, Jr.	Aug. 22, '39	Oct. 2, '39[1]	Feb. 5, '40[2]	Oct. 2, '40	(1)	
21-A	Flour[3]	Identity	A. W. Willcox	Aug. 3, '40	Sept. 9, '40[2]	Dec. 17, '40	April 1, '41	May 27, '41[3]	Jan. 1, '42
B	Durum flour	Identity	A. W. Willcox	Aug. 3, '40	Sept. 9, '40	Oct. 28, '40	April 1, '41	May 27, '41	Jan. 1, '42
C	Whole-wheat flour	Identity	A. W. Willcox	Aug. 3, '40	Sept. 9, '40	Oct. 28, '40	April 1, '41	May 27, '41	Jan. 1, '42
D	Cracked wheat	Identity	A. W. Willcox	Aug. 3, '40	Sept. 9, '40	Oct. 28, '40	April 1, '41	May 27, '41	Jan. 1, '42
E	Crushed wheat	Identity	A. W. Willcox	Aug. 3, '40	Sept. 9, '40	Oct. 28, '40	April 1, '41	May 27, '41	Jan. 1, '42
F	Whole durum wheat flour	Identity	A. W. Willcox	Aug. 3, '40	Sept. 9, '40	Oct. 28, '40	April 1, '41	May 27, '41	Jan. 1, '42
G	Self-rising flour	Identity	A. W. Willcox	Aug. 3, '40	Sept. 9, '40	Dec. 17, '40	April 1, '41	May 27, '41	Jan. 1, '42
H	Phosphated flour	Identity	A. W. Willcox	Aug. 3, '40	Sept. 9, '40	Dec. 17, '40	April 1, '41	May 27, '41	Jan. 1, '42
I	Farina	Identity	A. W. Willcox	Aug. 3, '40	Sept. 9, '40	Dec. 17, '40	April 1, '41	May 27, '41	Jan. 1, '42
J	Semolina	Identity	A. W. Willcox	Aug. 3, '40	Sept. 9, '40	Dec. 17, '40	April 1, '41	May 27, '41	Jan. 1, '42
23	Canned fruits	Identity[4]	M. F. Markel	Aug. 17, '40	Sept. 16, '40	Dec. 11, '40			
24	Dietary foods	Label statements	M. F. Markel	Sept. 5, '40	Oct. 7, '40	Nov. 25, '40			
25	Oleomargarine	Identity	E. B. Williams	Oct. 11, '40	Nov. 18, '40	Jan. 6, '41	April 17, '41	June 7, '41	Sept. 5, '41
26	Chocolate Products[5]	Identity	M. F. Markel	Oct. 19, '40	Dec. 9, '40	July 1, '41			
27	Fruit cocktail	Identity, Quality and fill of container	M. F. Markel	Dec. 11, '40	Jan. 13, '41	Feb. 8, '41			
28	Canned fruits[6]	Quality	M. F. Markel	Dec. 11, '40	Jan. 16, '41[7]				
29	Neufchatel and cottage cheeses	Identity	W. G. Green, Jr.	Jan. 30, '41	April 21, '41[8]	June 30, '41			
30	Habit forming drugs	General Regulations	M. F. Markel	Jan. 30, '41	Mar. 3, '41	May 1, '41			
31	Breads, rolls or buns[9]	Identity	A. W. Willcox	June 7, '41	July 7, '41				

* Docket 1 pertains to tomato products, 2 to canned tomatoes, 3 to eggs and egg products, 4 and 9 to coal tar colors, and 5 to canned peaches, apricots, pears and cherries. See FOOD INDUSTRIES, October 1939, page 569; January 1940, page 70; and February 1940, page 73, for data on these standards. Docket 6 pertains to canned peas; 7, cream and milk; 8, canned vegetables; 10, fruit jams, jellies and butters; 11, cheddar cheese, washed curd cheese and colby cheese; 13 and 14 coal tar colors; 15, dietary foods (cancelled); 16, canned tomatoes; 17, flours (cancelled); 18, canned asparagus; 19 and 20, canned cherries; 22, tomato catsup. See FOOD INDUSTRIES, September 1940, page 66; and December 1940, page 90, for data on these dockets.

[1] Hearing reopened on April 21, 1941, by order in *Federal Register*, March 11, 1941. (Docket No. 29.)

[2] Time extended from earlier date previously announced.

[3] During course of hearing, five new sections were added to this docket and all sections were renumbered as follows: 21-A, plain flour; B, enriched flour; C, bromated flour; D, enriched bromated flour; E, durum flour; F, self-rising flour; G, enriched self-rising flour; H, phosphated flour; I, whole-wheat flour; J, bromated whole wheat flour; K, whole durum wheat flour; L, crushed wheat; M, cracked wheat; N, farina; O, enriched farina; P, semolina.

[4] Amendment to orders published in *Federal Register*, Dec. 22, 1939, and Jan. 9, 1940. (All parts of Docket No. 5.)

[5] Including cacao nibs; chocolate liquor; sweet chocolate (coating); skim milk chocolate (coating); buttermilk chocolate (coating); mixed milk, skim milk, buttermilk, malted milk chocolate (coating); cocoa; breakfast cocoa; low-fat cocoa; sweet cocoa and fat (other than cacao fat) coating; and sweet chocolate and fat (other than cacao fat) coating.

[6] Amendment to docket No. 5, Parts I, II and III, orders of Dec. 22, 1939, and Jan. 9, 1940.

[7] Postponed until further announcement. See *Federal Register* March 25, 1941.

[8] Postponed from March 17, 1941. By order in *Federal Register*, March 11, 1941.

[9] There are 12 sections of this docket, as follows: 31-A, bread, rolls or buns; B, enriched bread, rolls or buns; C, milk bread, rolls or buns; D, cream bread, rolls or buns; E, butter bread, rolls or buns; F, egg bread, rolls or buns; G, honey bread, rolls or buns; H, butter and egg bread, rolls or buns; I, milk and honey bread, rolls or buns; J, raisin bread, rolls or buns; K, wholewheat bread, rolls or buns; L, bread, rolls or buns made with mixtures of flour, whole-wheat flour, cracked wheat, crushed wheat.

Schedule of Events

JULY

8—10—National Confectionery Salesmen's Association of America, Atlanta, Ga.
10—12—Convention of the Southern Wholesale Confectioners Association, Biltmore Hotel, Atlanta, Ga.
16—18—National Cherry Festival, Traverse City, Mich.
17—Tri-State Packers' Association, midsummer meeting, Talbot Country Club, Easton, Md.

AUGUST

20—23—National Food Distributors Association, Sherman Hotel, Chicago, Ill.
28—American Cranberry Growers Association, Pemberton, N. J.

The announcement of this hearing and the proposed definitions and standards of identity for a number of varieties of this staff of life were printed in the *Federal Register* on June 7. There will be 12 sections of the docket dealing with plain bread and rolls or buns, and with the enriched, milk, cream, butter, egg, honey, butter and egg, milk and honey, raisin and whole-wheat breads and rolls or buns, and "breads, rolls or buns, made with mixtures of flour, whole-wheat flour, cracked wheat, crushed wheat." Alanson W. Willcox will be the presiding officer.

"The proposed standard for enriched bread differs in one respect from the standard for enriched flour. Although the minimum requirements for vitamin B_1, riboflavin, nicotinic acid and iron are proportionally the same as in enriched flour, the maximum amounts of vitamin B_1 and riboflavin are four times the minimum. In the case of enriched flour, the maximum amounts of riboflavin and vitamin B_1 permitted are only $1\frac{1}{2}$ times the minimum."

The final order for oleomargarine was printed in the June 7 *Federal Register*. The effective date of the order, which is practically identical with the tentative order announced in April, is September 5.

Plan Wheat Import Quota

ESTABLISHMENT of import quotas on wheat and wheat flour from Canada has been approved by President Roosevelt, and Canada has been notified by the Department of State that such action is to be taken. The quotas are necessary to protect the United States against an influx of wheat and wheat flour in a year when domestic production is better than average and possibilities for export extremely limited.

To Boost Soybean Acreage

CHANGES in the agricultural conservation program of the Department of Agriculture have been made to encourage increased production of soybeans for oil. This step was taken last month to avoid undue depletion of vegetable oil stocks and to insure ample supplies for defense.

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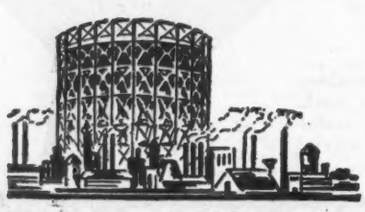


KEMP of BALTIMORE

Want Less Tin Used In Collapsible Tubes

USERS of collapsible tubes of tin have been asked to employ a "10-percent tin-coated" material instead of all tin wherever this is possible. It is estimated that about 70 percent of the tin now used in such tubes for shaving cream, paint, adhesives, and so forth, can be so saved. But it is recognized that food materials may not always safely be so packed, either in tin-coated or tin-alloy tubes. Compulsory regulations have not yet been imposed in any of these cases. But "requests" are being generally observed lest mandatory regulation be adopted.

Government Makes Labor Check-up in Canneries

EARLY last month the Wage and Hour Division of the Department of Labor launched a nation-wide drive for full compliance by the canning industry with requirements of the Wage and Hour Law. The drive started in the South and will progress northward with the fresh fruit and vegetable season. Some 400 inspectors are assigned to this work. These men will visit every canning plant, large or small, in the country.

Cork Production Halved

PRODUCTION of cork products in the United States will be cut in half, by order of E. R. Settinius, Jr., Director of Priorities. This step is made necessary by shipping uncertainties and a serious shortage in cork resulting from inability to obtain sufficient imports to meet rapidly increasing production schedules.

Millers Make Tools of War

MINNEAPOLIS flour milling companies are turning their machine shop facilities over to defense work. However, there has been as yet no curtailment in flour production as a result of this defense work. The industry has a capacity estimated of 30 percent above potential domestic and export requirements.

Wants Milk Diverted From Cheese to Britain

SECRETARY WICKARD'S appeal to the American people to eat less cheese, which came during June, was aimed primarily at helping to divert more surplus milk to dry skim milk processing for shipment to the British. The plea was the first formal government appeal to Americans to voluntarily reduce their consumption of a food commodity to help feed Britain, but it is not likely to be the last.

Dry skim milk is one of Britain's chief

food needs from this country under the lend-lease program, and Surplus Marketing Administration has been in the market for it since the start of the British-aid operations. SMA also has been buying large quantities of cheese, purchases to mid-June totaling 31,998,799 lb.

Secretary Wickard's statement on cheese brought prompt protest from the Wisconsin Congressional delegation, which spent two hours pointing out that dairymen spend millions of dollars annually to build up the cheese trade, a campaign which has been stepped up since import markets were closed. Wickard stood pat, however.

CAPITAL VIEWS

MORE DEFERMENTS—At mid-June it appears that blanket deferments will be given the older registrants under the Selective Service Act. This may enable food executives to plan with more confidence on which men they can keep and which they are likely to lose through the draft. The Army definitely wants only men under 27 or 28 years of age at the time of induction. They are likely to have their way. Also, the Army is strongly in support of the plans giving industry protection against draft of really skilled specialists. Any firm that has lost an "essential" man can get him back by making suitable application direct to the office of the Undersecretary of War.

CANNERY INSPECTIONS—Any canners who are not observing Wage-Hour regulations and keeping adequate records of employment are likely to be embarrassed. The wage-hour division promises careful inspections this summer during the busy season. Administrator Fleming has given special notice that, without any attempt to be hypercritical, his inspectors will visit almost every cannery during the present season to make sure that wage and hour rules are being properly observed.

ANTITRUST ACTIONS—If there were previously any doubts as to Assistant Attorney General Arnold's plans, these were dissipated by sweeping indictments returned by various grand juries during June. Extensive price-fixing and monopolistic control policies are charged against nearly 200 defendants in California and a combination of bakers and bakery unions in Washington, among others. There will be plenty more such cases soon. One cynic even asks, "Will OPACS Director Henderson figure the defense of antitrust suits as a legitimate part of the increased cost of doing food business?"

TRANSPORT SHORTAGE—There will be shortage of gasoline and fuel oil in the Northeastern States late in the summer and during the fall. Almost equally sure is the prospective shortage of freight cars and locomotives to pull freight trains during the rush season of crop movements. Transportation executives of food companies are therefore simultaneously on two horns of the transport dilemma. The only safe conclusion is that it is going to cost more to move goods, both incoming raw materials and outgoing products. And it will be increasingly difficult to move them on schedule as defense activity speeds up.

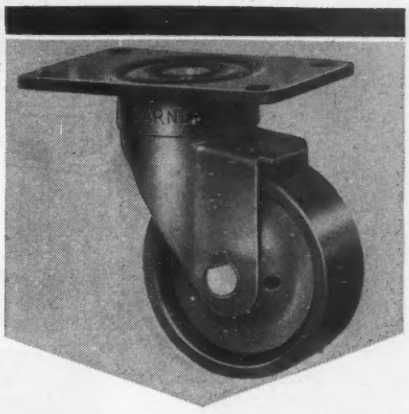
"UNFAIR" TAXES—Some food executives charge that certain tax plans presented to Congress are very unfair to their industries. In the forefront of this group are spokesmen for soft drinks. They point out that persons seeking refreshment for 5 cents or 10 cents may easily be diverted from carbonated beverages to other confections or refreshment by imposition of a penny-per-bottle tax. To support their cause they emphasize the undisputed fact that the result may be a shrinkage in the beverage business, which in turn means a serious curtailment of consumption of fruit juices, sirups and other commodities for which the beverage maker is an extremely important customer. Even the friends of the beverage industry are not too optimistic that Congress will be deterred by these arguments.

MEATLESS OR MILKLESS?—Officially, Secretary of Agriculture Wickard states that meatless or milkless days will not be necessary. But the very fact that so important an official recognizes this possibility is the best ground for fear that real shortages will be experienced before the year is over. To meet the needs of the United States and Britain, just to use one example, will require one-third increase in cheese output and one-quarter increase in evaporated milk production. It seems unlikely that the objectives will be reached either on these two commodities or on several others. Competing foods can take some comfort, as there will be an abundance of food, generally speaking. A generous amount of dinner-table substitution can be anticipated.

SUGAR QUOTAS—Recent estimates of demands have occasioned an increase in official quotas for sugar for the 1941 season.

However, the Department of Agriculture still allots over 2 million tons of the total production to Hawaii and the Philippines, despite the certain lack of shipping to bring goods from those remote sources. Beet and cane states and Caribbean neighbors are none too happy about this. Critics say that later the Department will have to radically change its plans to meet the shipping shortage.

ARGENTINE COMPETITION—The list of goods which Argentina hopes to sell in the United States is significantly competitive with American food suppliers. But we must somehow buy active Argentine cooperation in Hemisphere defense. Farmers, stock growers, and to some extent American food processors, will have to accept this burden, if Washington arrangements go forward as now planned.



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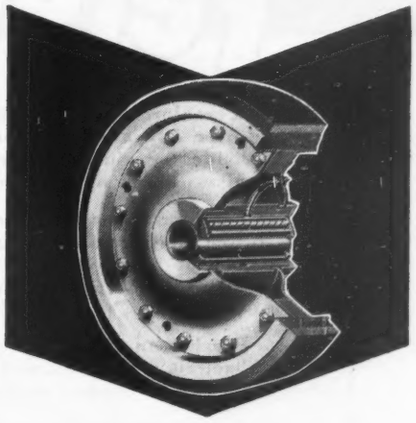

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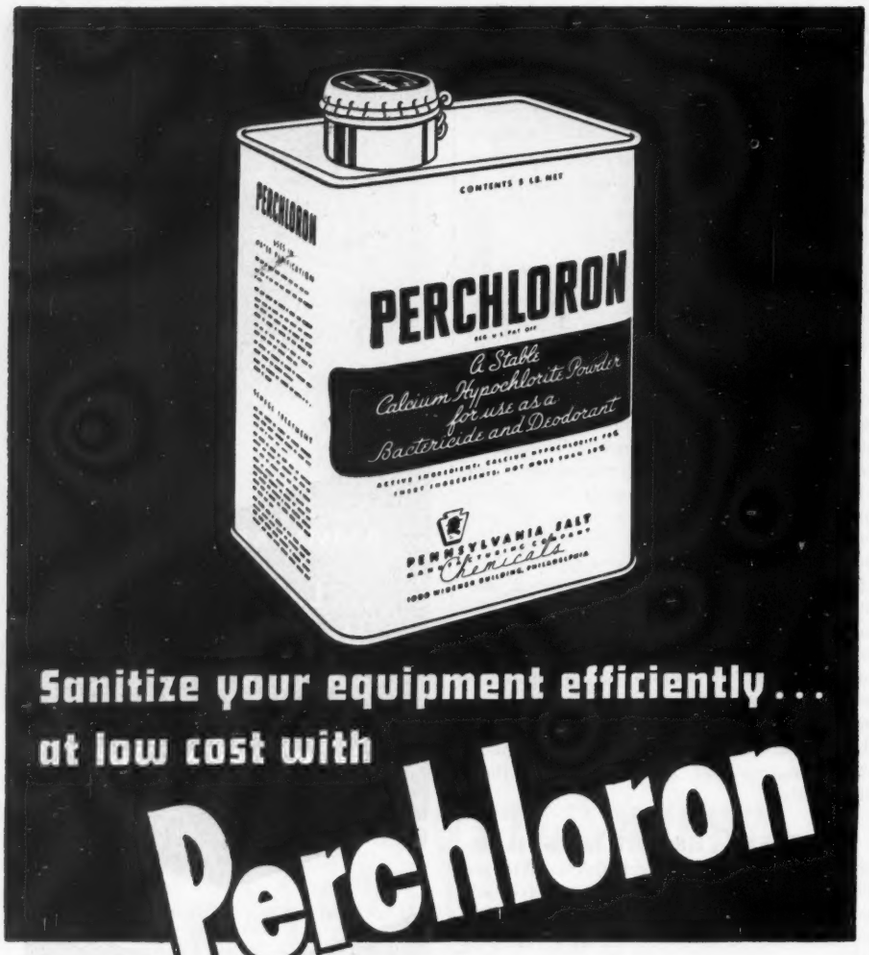

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Perchloron can be used to advantage by milk and ice cream plants as an aid in killing bacteria . . . by creameries and cheese factories to help prevent off-flavors in butter and gassy cheese . . . by beverage plants to aid in the control of yeasts . . . by canning, preserving, baking and candy companies to help avoid bacterial spoilage, to deodorize fluid wastes, etc.

Readily dissolved in water, Perchloron may easily be applied to food processing equipment by flow, spray or immersion methods. And Perchloron keeps its strength for long periods of time when stored in closed containers. It comes in 5 lb. cans with airtight covers, 9 to the case; or in 100 lb. drums.

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Higher Cost of Living Blamed on Food Prices

MUCH of the recent increase in the cost of living, indicated by wholesale and retail price indexes, is blamed by Washington on the rise in food costs which have occurred during May. Both government and unofficial figures show that the recent price changes, which have been going on for nearly three months, can be traced back to food items, especially those which are somewhat dependent on agricultural raw material prices. The prices received by farmers are about 14 percent above a year ago, according to some generally accepted indexes. But this, according to price critics, does not fully justify recent food quotations. This attitude appears to impose serious difficulties on the food industry, as the mark-up margins are being greatly narrowed or even disappearing altogether.

Thiocarbamide Prevents Browning of Sliced Fruit

DISCOVERY of an effective method of preventing the browning of cut plant tissues has been announced by scientists at Boyce Thompson Institute for Plant Research, Inc., Yonkers, N. Y. This method involves the use of a nontoxic chemical, thiocarbamide, which has been made available to the public in tablet form.

One tablet of the thiocarbamide is dissolved in one quart of water and the fruit dipped into the solution for not more than 30 seconds. The fruit is then drained and placed into a refrigerator. Fresh sliced fruit treated in this manner will retain its original color for one day at room temperature. Frozen or in cold storage, the fruit will retain its color for many months.

This method may also be carried out during canning operations, a dilute solution being used.

Apple juice may be treated with a thiocarbamide solution either before or after darkening occurs. In the latter case the natural color is at least partially restored.

New Bleaching Process Developed for Flour

CHLORINE DIOXIDE, a new and more efficient bleaching agent for flour, was described by Dr. Charles G. Ferrari, General Mills Research Laboratories, at the recent meeting of American Association of Cereal Chemists.

Chlorine dioxide bleaches the flour instantaneously and also oxidizes the "carotene" in flour to an extent that usually requires about twice as much nitrogen trichloride. It also exerts a maturing action on the flour.

The amount of chlorine dioxide to produce the best baking results varies with the type of flour. However, 0.3 to 1.5 grains per barrel is usually enough for most patent flours, but a larger amount is sometimes needed for first-class flour.

It is not desirable to add more than 2 grains of chlorine dioxide per barrel because of the possibility of injuring the keeping power of the flour. If bleaching is difficult and further bleaching action is needed, benzoyl peroxide can be used in addition to the chlorine dioxide.

Macaroni Manufacturers Discuss Trade Problems

VITAMIN FORTIFICATION of macaroni products, extension of the macaroni promotion program, trade practices, control of insect infestation and availability of raw materials were subjects discussed at the convention of National Macaroni Manufacturers Association in Pittsburgh, June 23 and 24.

Proposals for vitamin and mineral enrichment of macaroni products were considered in anticipation of hearings likely to be held by F&DA to agree upon standards of identity.

Director of Research B. R. Jacobs reported a method of incorporating vitamin B_1 in macaroni products which reduces losses during cooking in hot water for 15 minutes from 50 to 60 percent of the B_1 content to approximately 20 percent. By that method, raw-material cost of giving hot-water-cooked macaroni products a B_1 content of 1.66 mg. per pound may be reduced from $0.022 to $0.015 per pound at present B_1 prices. And the possibility of adding dried yeast to macaroni products to heighten flavor and nutritive values was announced.

Recommendation was made to extend the macaroni association's activities under the direction of M. J. Donna to include publication of an 8-page rotogravure mailing piece to be known as "Food Pictorial."

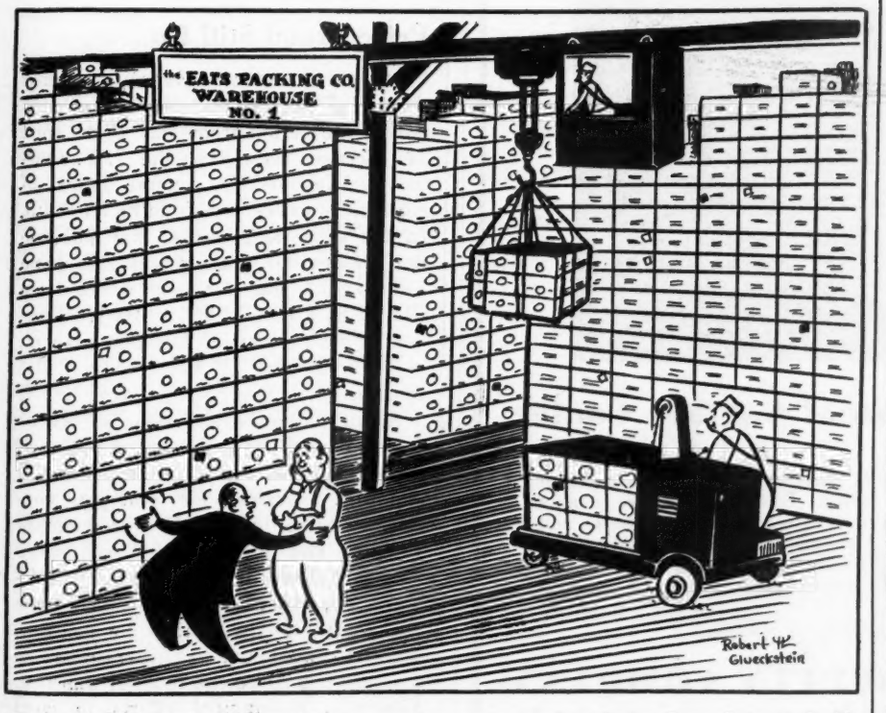
Clyde H. Campbell, chemist, Pennsylvania Department of Agriculture, reported 10 to 12 percent of seizures on all complaints of food law violations.

Recommendations were also made to continue alert vigilance of enforcement of fair trade practice regulations, for elimination of the multiplicity of grades of raw materials used in macaroni products, with consequent simplification of the macaroni products made.

C. W. Wolfe, Megs Macaroni Co., Harrisburg, Pa., was elected president; A. I. Grass, I. J. Grass Noodle Co., Chicago, vice-president; and Joseph J. Cuneo, La Premiata Macaroni Corp., Connellsville, Pa., advisor. Secretary-treasurer M. J. Donna and Director of Research B. R. Jacobs were reelected.

Crop Prospects High

ACCORDING to the June report of the Department of Agriculture, released on June 10, prospects for important grain and fruit crops this year are near-record in proportions. With winter wheat forecast at 697,692,000 bu. and spring wheat at 213,007,000 bu., a total wheat crop of 910,699,000 bu. is expected, compared to last year's total of 816,698,000 bu.



"Now stop and think! Where did you put that case we set aside for Gorp Grocery Co.?"

STOP
THAT WEEVIL!

IN plants where food is processed and stored, weevils and other destructive pests can be controlled by thorough fumigation with an effective fumigant such as HCN gas. Careful planning, good housekeeping and application of the fumigant by trained, experienced men are essential for a good kill.

Many food processors have found that control problems are ably handled by established Pest Control Operators. These operators are equipped to give prompt and specialized service on practically any type of mill fumigation.

If you have your own pest control crew, we have a useful book about pests and their control by fumigation. Just drop us a line on your letterhead and we will be glad to send you a copy. No obligation, of course.

DU PONT

E. I. DU PONT DE NEMOURS & CO.
INCORPORATED
THE R. & H. CHEMICALS DEPARTMENT
WILMINGTON • DELAWARE

CYANEGG
AN ECONOMICAL SOURCE
OF HCN FUMIGATING GAS

and to a ten-year average of 747,507,000 bu.

Other grain crops are also expected to be large. Rye production is estimated at 44,828,000 bu., compared to 40,601,000 in 1940 and to a ten-year average of 38,472,000. The crop of oats is expected to be 1,117,419,000 bu., down from 1,235,628,000 bu. in 1940 and comparing to a ten-year average of 1,024,852,000 bu. Indicated barley output is 318,054,000 bu., with production of this crop in 1940 at 309,235,000 bu., and a ten-year average crop of 225,486,000 bu.

Among the important fruits, the peach crop is estimated to be 66,102,000 bu. compared to 54,430,000 bu. in 1940 and to a ten-year average of 54,356,000 bu. Pear output is expected to drop slightly, with 30,261,000 bu. this year against 31,622,000 bu. last year, but will be above the 1930-1939 average of 27,278,000 bushels.

More Dehydration Expected

In a report on the dehydrated vegetable industry, made by L. K. Harper, Chairman, Dehydrated Food Industry Committee, it was stated that seven companies, operating 15 plants, produced 5,865,227 lb. of dehydrated vegetables in 1940. Of this output, 1,658,613 lb. consisted of products to be used as vegetables, in soup mixtures, or for rehydration individually in a soup. The remaining production, 3,206,614 lb., consisted of vegetables dehydrated as powders, to be used as seasoning.

Estimated output of the same firms in 1941 was placed at 6,350,000 lb., to take care of expected civilian demand. Most of this increase is expected to take place in the vegetables to be used as such, not in the seasonings.

With eight firms in the industry, operating 17 plants, the report states that the 24-hour capacity would be 515,000 lb. per day, or a total of 66,000,000 lb. per year. Of this, 16,000,000 lb. would be for vegetables to be used as such. These figures represent at least 90 percent of the industry. Whether or not this excess capacity over civilian demands will be sufficient to take care of defense and lend-lease needs cannot be determined as yet. However, a potential reservoir of capacity exists in the fruit-drying industry.

Construction News

	Pending (thousands)	Awarded June (thousands)	Total Awarded 1941 (thousands)
Bakery	$450	$40	$3,322
Beverages	1,517	360	4,764
Canning and Preserving	.....	.....	385
Cold Storage Plants	315	.....	635
Confectionery	75	.....	85
Grain Mill Products	655	443	4,480
Ice Manufactured	.....	.....	180
Meats and Meat Products	600	115	869
Milk Products	165	320	1,451
Miscellaneous	402	286	3,152
	$4,179	$1,564	$19,323

Oil and Fat Production Expected To Increase

WITH PRICES of oils and fats averaging 40 percent higher in May, 1941, than in the previous May, and with production of butter, cottonseed oil and peanut oil proceeding at a higher rate than last year, there is good reason to expect that total production of domestic oils and fats will be somewhat above last year's record output. Much will, of course, depend upon 1941 crops of cotton, peanuts, soybeans and other oil raw materials. And crops will, in turn, depend upon the acreage harvested and the weather.

However, in spite of adverse weather conditions reported from some areas, particularly the Southeast, it is likely that the domestic output of oil seeds will total as high as last year. Also, lard and butter production still continue at record levels.

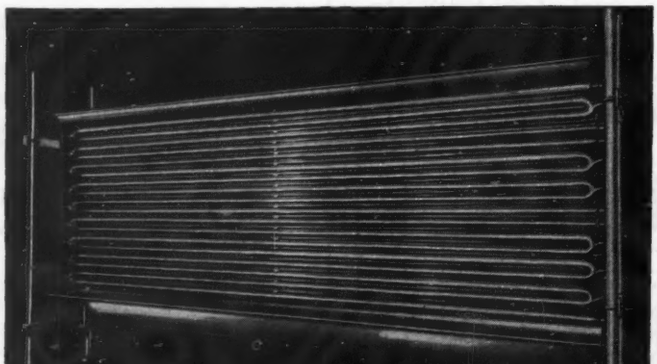
This domestic supply situation is likely to more than compensate for reductions in imports of oils and fats, which, at the highest, were only about 15 percent of the total domestic consumption.

Price Trend Still Up

COMMODITY PRICE LEVELS continued their rise of the past several months during the period from May 17 to June 14. Between these dates the *N. Y. Journal of Commerce's* general index of commodity prices rose from 88.7 to 91.5. In the same four weeks, that publication's index for grain prices rose from 74.8 to 76.2, and for food prices from 79.3 to 85.7 (1927-1929 = 100). *Business Week's* index of business activity, at 143.5 on May 17 had risen to 151.1 by June 14.

Again the price situation, so far as food commodities were concerned, had little to do with the supply and demand situation. Grains, for example, continued to rise, in spite of over-abundant supplies and prospects of even more abundant harvests. Increased production costs, placing of a floor under some agricultural product prices by the government, and plain, unadulterated speculation seem to be the roots of this rise. Evidently, government efforts to curb speculation have had little effect, as yet.

CHESTER COOLERS



"Y" type *Stainless Steel* Surface Cooler

The improved design of the returns used in this cooler increases its efficiency, as it permits all refrigerated parts of the cooler to come in contact with the liquid that is to be cooled. Each pair of tubes is hung separately to the flexible stainless steel rack to care for the stresses and strains due to varying temperatures. Construction eliminates solder and permits electric welding of seams. Equally well adapted for ammonia or water cooling, and can be used in combination with any other type of cooler.

Complete details furnished on request.

CHESTER DAIRY SUPPLY COMPANY

9th & Hyatt Sts. *Sanitary Heat Exchangers* Chester, Pa.

In the four weeks under consideration, spot prices of most important foods went up. Wheat, No. 2 dark winter, at 91½c. on May 17, rose to 94½c. on June 14. Flour was steady for the period, at $5.90. Corn, No. 3 yellow, upped from 71½c. to 73¼c. Beef increased from 16c. to 16½c., lamb from 17c. to 18c., and pork loins from 18½c. to 21c. Butter decreased from 36¼c. to 34½c., but cheese rose from 20¾c. to 21¾c. and eggs rose from 23¾c. to 25¾c. Among the imported foods, sugar rose from $3.38 to $3.50, cocoa fell from $8.07 to $8.00, while coffee increased from 10¾c. to 11⅝c. Important canned foods showed few changes, but canned tomatoes increased from 75c. to 79c.

INDICATORS

SUGAR DELIVERIES, first five months of 1941, as reported by the Sugar Division, U.S.D.A., were 3,246,813 short tons, raw value, compared to 2,417,645 tons in the corresponding period last year.

SUGAR SUPPLIES of the world, 1940 crop and carryover, are estimated by the Bureau of Agricultural Economics at 42,300,000 short tons, raw value, the largest supplies on record.

HOG PRICES, around $9.25 in mid-May, topped $10 in mid-June, the highest price since July, 1938. This rise was in spite of higher marketings than a year before.

FLOUR PRODUCTION in May, 1941, for mills producing 65 percent of U. S. output, was reported by *The Northwestern Miller* at 5,785,160 bbl., compared to 5,533,312 bbl. in May last year.

TOMATO ACREAGE for manufacture in 1941 was reported in mid-June to be 466,790 acres, 11 percent above the 420,440 acres planted in 1940, instead of the 50 percent increase sought.

CANNED PEA SHIPMENTS for the crop year ending June 1, 1941, totaled 26,558,702 cases, an all-time record. Carryover on the same date was 1,530,188 cases.

SALMON PACK in Alaska is expected to be smaller than usual this year, even if the run of fish is normal, because of the restriction of the season in the Bristol Bay area to 20 working days.

WEIGHT OF HOGS marketed at Chicago, week ending June 14, was 247 lb. on the average, compared to 236 lb. a year before.

FLUID MILK daily average sales in April, 1941, are reported by the Milk Industry Foundation as 4.36 percent above sales in April, 1940.

BUTTER, creamery, produced in April, 1941, was 163,535,000 lb., 6.9 percent over April, 1940, production and 18.1 percent over the April average in 1930-1939.

AMERICAN CHEDDAR CHEESE production in April, 1941, totaled 54,120,000 lb., compared to 48,550,000 lb. in April, 1940, and to a 1930-1939 average of 36,488,000 lb. for April.

EVAPORATED MILK output in April, 1941, was 258,014,000 lb., a record, 12 percent higher than in April last year and 36 percent above the 1930-1939 April average.

CONDENSED MILK production in April, 1941, was 9,433,000 lb., the highest for any month since March, 1931.

OLEOMARGARINE sales in April, 1941, as indicated by sales of internal revenue stamps, totaled 33,980,146 lb., 32 percent over sales in April, 1940.

FRUITS, frozen, in storage on June 1, 1941, totaled 89,983,000 lb., compared to 82,361,000 lb. a year before, and to a 1936-1940 average amounting to 72,448,000 pounds.

VEGETABLES, frozen, in storage on June 1 this year amounted to 43,320,000 lb., compared to 46,395,000 lb. a year ago.

BUTTER, creamery, in storage on June 1, 1941, was 56,359,000 lb., compared to 25,463,000 lb. on June 1, 1940, and to a June 1 average of 41,845,000 lb. in 1936-1940.

CHEESE, all kinds, in storage on June 1 this year amounted to 119,628,000 lb., compared to 88,102,000 lb. a year previous and to 82,864,000 lb. as a 1936-1940 June 1 average.

EGGS, case equivalent, in storage on June 1, 1941, totaled 9,437,000 cases, against 9,517,000 cases a year before, and an average for June 1 in 1936-1940 of 9,420,000 cases.

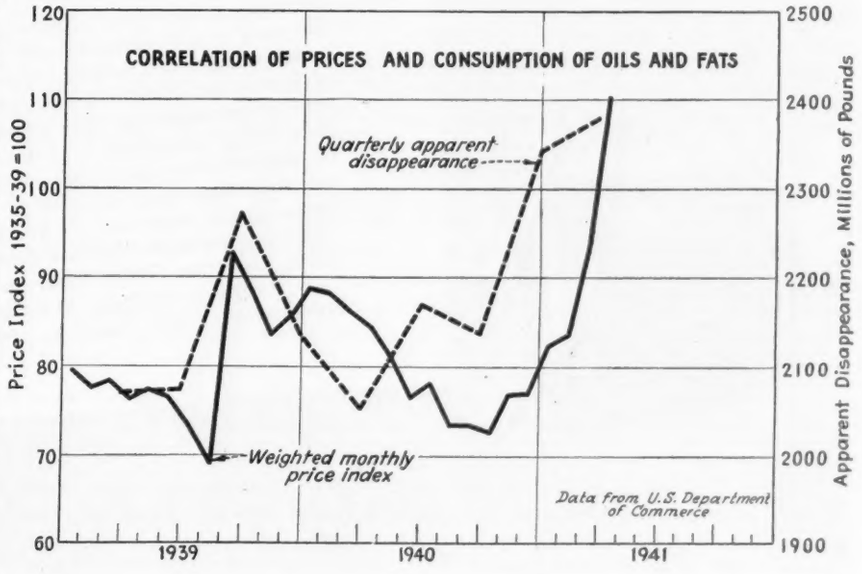
POULTRY, all kinds, in frozen storage on June 1 this year totaled 87,427,000 lb. The figure for June 1, 1940, was 76,904,000 lb. and the June 1 average in 1936-1940 was 64,004,000 pounds.

MEAT, all kinds, in cure and frozen storage on June 1, 1941, amounted to 952,927,000 lb. This compares to 726,415,000 lb. on June 1, 1940, and to an average for June 1 of 656,381,000 lb. in 1936-1940.

LARD in storage, June 1, 1941, totaled 353,737,000 lb., and rendered pork fat on the same date totaled 7,015,000 lb. The combined figures for these two products on June 1, 1940 was 283,937,000 lb., and the average June 1 figure in 1936-1940 was 168,197,000 pounds.

WEEKLY WHOLESALE FOOD PRICE INDEX of Dun & Bradstreet stood at $2.99 on June 17, compared to $2.18 for the corresponding date of 1940 and within $0.02 of the March, 1937 peak.

COST OF LIVING INDEX of the National Industrial Conference Board was 87.4 at the end of May, up from 86.9 one month before (1923 = 100).



POSITIVE PROTECTION FOR COLD LINES AND FITTINGS . . .

. . . with dependable Armstrong's Cork Covering

HEAT and moisture are costing you money unless *all* your refrigerated lines and fittings are properly insulated. And proper insulation means . . . first, an adequate insulation thickness to keep heat loss at a minimum . . . second, a material which does not allow moisture penetration . . . third, an installation with tight joints which prevent air and moisture from reaching the cold line . . . and fourth, a material which will keep its insulating efficiency for years.

Armstrong's Cork Covering measures up 100% in all these requirements. It is made of pure cork—a highly effective barrier to the passage of heat. And it is made in thicknesses offering maximum insulating efficiency for various temperature differences. Armstrong's Cork Covering is also highly resistant to moisture and all common causes of deterioration. Properly installed and maintained according to Armstrong specifications, it will remain moistureproof and efficient for years!

Armstrong's Cork Covering offers the further advantages of light weight, structural strength, and rigidity. This assures a permanent, close fit to the cold line, without sagging or buckling! Installation is quick and inexpensive because the standard sizes and shapes available fit accurately and are easily applied. In addition to three standard thicknesses, special thicknesses are available to meet any need.

Get complete information now about this effective, money-saving insulation. Write today to Armstrong Cork Company, Building Materials Division, 916 Concord Street, Lancaster, Pennsylvania.

ARMSTRONG CORK COMPANY

Men, Jobs & Companies

INDUSTRY

Alabama Flour Mills, Decatur, Ala., has been organized to process grain shipped by barge line on the Tennessee River. The mill is one of the several new industries coming to North Alabama with development of navigation facilities on the river.

Birds Eye Frosted Foods Co. will add two new products to its 1941 pack. Mixed fruits for salads and boysenberries are being quick frozen for the first time in the Birds Eye plant at Hillsboro, Ore.

Continental Baking Co. stockholders will meet in Wilmington, Del., on July 15 to vote on a plan of recapitalization providing for payment of arrears, retirement of part of the preferred stock and exchanges for other securities.

Cudahy Packing Co. has moved its shortening and oil division headquarters from the general offices in Chicago to Memphis, Tenn., to be near the center of the cottonseed area. A. C. Voss will manage the division. . . . Cudahy has opened a new plant in Huntsville, Ala., with F. L. Teer as local manager.

Doughnut Corp. of America's eight-story plant at Ellicott City, Md., was destroyed on May 27 by fire. The building where doughnut-making machines were manufactured, the cereal plant, flour mill, 12 boxcars of dry doughnut and cake mix and 300 newly received 450-lb. drums of shortening were consumed by the flames.

SYLVAN L. STIX

Seeman Bros., Inc., has elected him president, succeeding the late Joseph Seeman. One of the leading food merchandising authorities, Mr. Stix has been associated with Seeman Bros. since 1891, becoming vice-president in 1920 when the firm was incorporated. New vice-president is J. Stanley Seeman.

E. C. RASMUSSEN

American Association of Cereal Chemists, midwest section, has named him chairman for the coming year. Mr. Rasmussen is with the baking powder division of Standard Brands, Inc. Newly elected vice-president of the midwest section is H. S. Mitchell, Swift & Co. laboratories, and secretary-treasurer is F. D. Machon of Durkee Famous Foods.

DONALD KIRK DAVID

Donald K. David, president of American Maize Products Co., New York, has been appointed associate dean of Harvard Graduate School of Business Administration, effective Feb. 1, 1942. The appointment includes the William Ziegler professorship of business administration. He was at one time president of Royal Baking Powder Co.

Dr. Pepper Bottling Co. of Staunton, Va., has been chartered to conduct a soft drink business, with $50,000 maximum capital.

Drypack Corp., Sodus, N. Y., will move to Lyons, N. Y., where it has acquired the former Merick malt plant.

Frozen Foods, Inc., Harrisonburg, Va., suffered damage of approximately $30,000 in the fire which recently swept its processing plant.

General Baking Co. has purchased 103,500 sq. ft. of land near Richmond, Va., where it will immediately begin construction of a new building.

Hostess Cake Kitchen, Seattle, Wash., plans a $200,000 addition to its baking plant there.

Kroger Grocery & Baking Co. has opened a new meat conditioning plant costing $150,000 at Grand Rapids, Mich. The plant, 150x60 ft., is especially designed for tenderizing meats by a process developed by the company in cooperation with scientists of Westinghouse Electric and Manufacturing Co. and Mellon Institute, Pittsburgh.

Francis H. Leggett & Co. will open a new branch warehouse at Jacksonville, Fla., under management of Howard B. Bonfield, southern representative for the firm.

John Morrell Co., Ottumwa, Iowa, meat packers, has awarded a contract for a three-story addition to its beef cooling department. Completion is scheduled for Nov. 15.

Newport Rice Mill, Inc., Newport, Ark., has filed articles of incorporation with authorized capital stock of 300 shares valued at $100 each and $13,000 paid in capital.

Standard Margarine Co., Indianapolis, has fortified its popular-priced margarine with vitamins A and D. Each pound of the enriched product contains 9,000 USP units of vitamin A, plus vitamin D.

Stokely Bros. and Co. has acquired a number of pickle salting plants in Minnesota from Pepin Pickling Co. of Winona. The company's new plant at Greenfield, Ind., formerly operated by Greenfield Canning Co., will be used for the packing of tomatoes this year.

Francis C. Stokes Co., food packer of Vincentown, N. J., who recently opened a celery juice plant at Sanford, Fla., is packing its products in No. 10 cans for sale to manufacturers of vegetable juice cocktail, soups and other foods.

..can help you meet AMS requirements More Easily

Whether or not your plant is now operating under AMS inspection and grading service, surely you will agree that maintaining high sanitary standards is essential to CONTROL QUALITY, avoid spoilage losses and increase consumer acceptance of your product.

That is why TESTED, dependable Oakite cleaning materials can help you! Their remarkable emulsifying and wetting-out properties make cleaning EASIER . . . provide thorough, fast results in cleaning (1) canning sinks, cutting, sorting, peeling tables; (2) mixers, vats, tanks, kettles, cookers; (3) syrup fillers, labeling machines, blanchers, pasteurizers, exhaust boxes; (4) sanitary fittings, pumps and piping; (5) conveyor belts; (6) floors and walls.

For subsequent germicidal treatment, use Oakite Bactericide. Since it provides a MORE ACTIVE form of available chlorine, it kills bacteria FASTER, thus assuring more COMPLETE CONTROL over contaminating organisms.

Put the Proof Up to Us!

Let us prove that Oakite cleaning and germicidal materials can help you maintain desired sanitary standards more easily, at less cost. Our binding GUARANTEE is your protection, so won't you write for interesting FREE booklets and further data on your cleaning problems?

OAKITE *Tested* **CLEANING** FOR QUALITY CONTROL

Complete Nation-Wide Service For These Industries

- CANNED FRUIT
- SAUCES & SOUPS
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- MEAT PACKING
- SPICES & CONDIMENTS
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- MACARONI
- FROZEN FOODS
- CEREAL PRODUCTS

Manufactured only by

OAKITE PRODUCTS, INC., 26G THAMES ST., NEW YORK, N. Y.

Representatives in All Principal Cities of the United States and Canada

PERSONNEL

Lawrence Adams, Defiance, Ohio, is opening a new canning plant at New Bavaria, Ohio.

Charles B. Crofton, of Leval & Co., has been elected president of the New York Produce Exchange, succeeding James J. O'Donohoe, resigned.

Robert M. Farr has been elected president of Diamond Crystal Salt Co., St. Clair, Mich., to succeed Fred W. Moore, now chairman of the Board. Mr. Farr is president of the Salt Producers' Association of America.

Don Fisher, formerly New England representative of the Brolite Co., has become head of the new pastry division of Hathaway Bakeries, Inc.

Julius Fleischmann, a member of the board of directors of Standard Brands, Inc., has been assigned to duty as assistant naval attache to the United States legation at Ottawa, Canada.

Joseph Haxter, president of Columbia Baking Co., Atlanta, Ga., has succeeded H. P. Wasson as president of Southern Bakers Association.

J. L. Heid, formerly in charge of the U. S. Fruit and Vegetable Products Laboratory in Weslaco, Tex., has resigned to accept a position as chemist and production manager with California Citrus Juice Exchange, Inc., at Santa Ana, Calif.

B. S. Holmes, Tulsa, Okla., branch manager of Loose-Wiles Biscuit Co., has been named manager of the Oklahoma City branch of that company.

J. B. Hutson has been appointed president of the Commodity Credit Corp. His successor as director of the recently created Office of Agricultural Defense Relations is M. Clifford Townsend.

J. Lifszye, former director of European starch factories, plans to establish a plant in New Westminster, B. C., to manufacture starch and glucose from surplus potatoes.

Cecil Martin is in charge of the new Kroger tenderizing and distribution plant at Grand Rapids, Mich.

Henry W. Melin, Albany, Ga., has been elected president of the Southeastern Peanut Association.

Walter J. Nelson, sugar industry specialist for the Celite Filter-Aid department of Johns-Manville Corp., has resigned to become general superintendent of Imperial Sugar Co. at Sugarland, Tex.

H. L. Popp has been reelected president of the Independent Biscuit Manufacturing Co., Inc. C. H. Wortz was reelected vice-president.

C. A. Shillinglaw, Iowa State College de-

partment of bacteriology, has accepted a position with Coca-Cola Export Co., New York.

A. E. Sinclair, until recently general superintendent of Kingan & Co., is now with P. R. Mallory & Co., Inc., Indianapolis, manufacturer of precision electrical and metallurgical products.

Henry A. White, former vice-president and treasurer of Hawaiian Pineapple Co., has assumed presidency of the firm.

David W. Wilson, with Gibson Bros. Ltd., will establish and operate a salmon cannery in North Vancouver, B. C.

DEATHS

Charles A. Eckman, 69, former field superintendent for A. & P. Co., May 22, in East Orange, N. J.

Alfred G. Elder, 64, operator of large citrus fruit canning company, Bradenton, Fla., and president of Florida Canneries Association, June 10.

William D. Elliott, 74, for many years New England manager for the Coca-Cola Co., June 2, at Wiscasset, Me.

Walter A. Frost, 79, of Walter A. Frost & Co., Chicago food brokers, and former president of Chicago Food Brokers' Association, June 4, in Chicago.

C. Harold Isbell, 66, retired manager and treasurer of Clark Biscuit Co., North Adams, Mass., June 13, in Pittsfield, Mass. He was formerly associated with H. W. Clark Wholesale Co.

Leland D. Medearis, general manager of the Coca-Cola Bottling Works at Fayetteville and Columbia, Tenn., May 17, at Huntsville, Ala.

John Scholl, 64, president and owner of Scholl Dairy Products, June 13, in Chicago.

Frank J. Stevens, treasurer of Peet Packing Co., May 6, at Chesaning, Mich.

ASSOCIATED INDUSTRIES

Allegheny Ludlum Steel Corp. has created a committee for conservation of strategic materials, to act as a central clearing point for the company's technical activities.

Bakelite Corp. has installed its Bakelite Plastics Travelcade in the Buhl Planetarium, Pittsburgh, Pa., where it will stay until July 31. The Travelcade is designed to show the public the ways in which modern plastic materials serve both home uses and as vital parts in industrial machines.

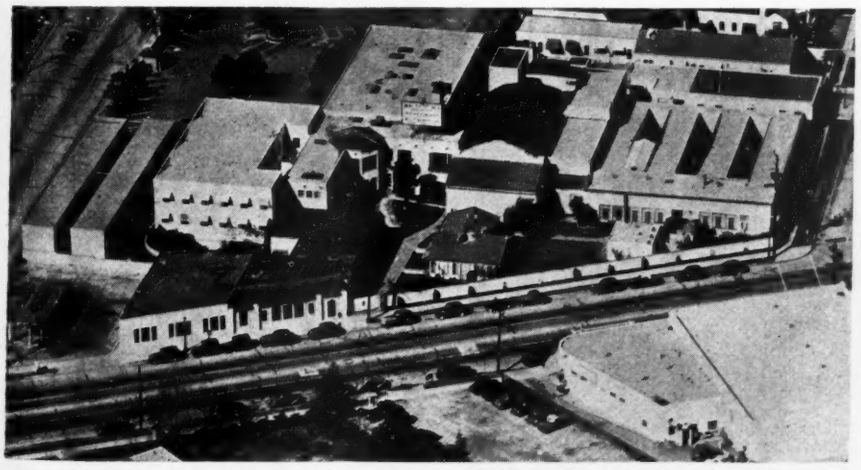
Continental Can Co., Inc., has awarded a contract for construction of a packers' can plant at Mankato, Minn. The one story plant will have a total floor space of 220,000 sq. ft. of manufacturing facilities.

E. I. du Pont de Nemours & Co. will construct at Louisville, Ky., a neoprene synthetic rubber plant with a capacity of 10,000 long tons a year, to provide a supply of neoprene that will be adequate for defense and commercial needs.

Food Machinery Corp.'s plant at Dunedin, Fla., has been placed entirely on defense contract work. Its regular line of equipment will be manufactured at a new plant under construction at Lakeland, Fla., with 84,000 ft. of working space and a 10,000-sq.ft. office building.

Gardener-Richardson Co., Middletown, Ohio, has developed a new boxboard, Coated Lithwite, which is manufactured and coated on the same boxboard machine.

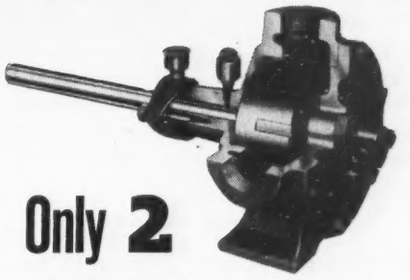
York Ice Machinery Corp. has added 1,000 employees to factory and branch personnel since Oct. 1940, due to defense production demands.



DISNEY STUDIO BECOMES VITAMIN PLANT

Wm. T. Thompson Co., Los Angeles, has purchased the former Walt Disney studios for conversion into a vitamin research and assay laboratory and manufacturing plant. Equipment and apparatus will gradually be moved from the company's present location to the new building where laboratories will be established in the large, air-conditioned animating rooms. Among the recent fortification assignments which Thompson has completed are included enriching bread, candy, carbonated beverages, bottled drinking water, ground coffee, peanut butter, prepared cereals, flour and beer.

STRIPPED FOR ACTION!



Only 2 MOVING PARTS

Inside and out, Viking is built for action. There are no intricate mechanisms, no power or efficiency wasting gadgets.

Every Viking Rotary Pump, regardless of size or style, employs the same, simple "2 MOVING PARTS" principle . . . the famous principle that reduces pump wear, cuts repair and replacement costs in half, makes servicing a quick, inexpensive job.

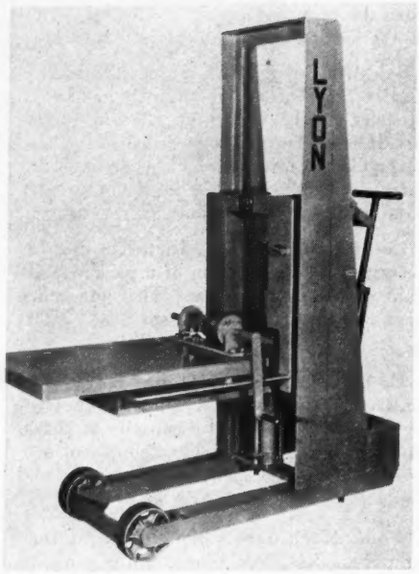
Bulletin 103-35 may be the answer to your present pumping problem. Write today for a free, illustrated copy and check specifications on mountings, drive arrangements and capacities.

VIKING PUMP COMPANY
CEDAR FALLS, IOWA

Food Equipment News

Hydraulic Elevating Truck

LYON IRON WORKS, Greene, N. Y., has introduced an elevating hand truck with hydraulically operated elevating and revolving table. The revolving table is arranged to revolve with stops at each 90-deg. In its standard position the table extends about one foot beyond the edge of the wheel, so that it can be put close to the machine that it is serving. The table is equipped with a winch for loading and unloading.



Hand truck with hydraulically operated elevating and revolving table.

Stainless Alloy

BETHLEHEM FOUNDRY & MACHINE CO. is producing a stainless alloy for castings called "Neutralloy". This alloy contains 73 percent of nickel and 14 percent of chromium. It is said to have a permanently bright and stable surface under both wet and corrosive atmospheres. One advantage of this stainless alloy is said to be its suitability for machining when in cast form.

Carton Stitching Equipment

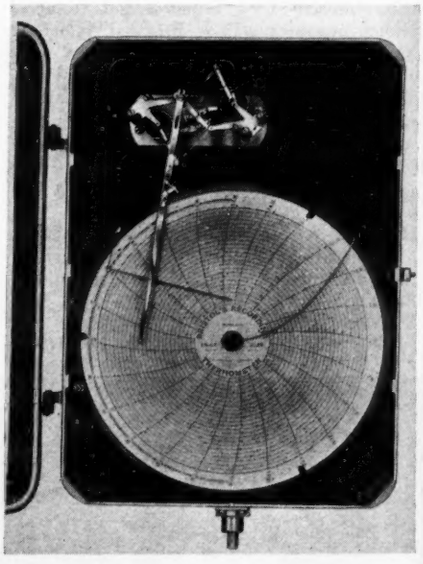
ACME STEEL CO., 2840 Archer Ave., Chicago, Ill., has announced a new complete line of straight-arm, bottom and combination carton stitching machines. Known as "Silverstitchers," this equipment is said to incorporate several unique features. Included is a special single-pedal control which is adjustable and is said to reduce by 50 percent the manual effort required for stitching.

The straight-arm type of Silverstitcher is designed for stitching the sides and ends of telescope and folding cartons, beverage cases, display units, setup and suit boxes and can be easily adapted for special applications. The bottom type of machine is made for stitching bottoms of fiber and corrugated containers, slotted cartons and collapsible boxes. The combination machine combines both the straight-arm and bottom type in one piece of equipment.

New carton stitching equipment.

Recording Thermometer

THE BRISTOL CO., Waterbury, Conn., has developed two new designs of recording thermometers of the liquid-filled type. These are known as the "Case-Compensated" Class 1 recording thermometer, and the "Fully-Compensated" Class 1 recording thermometer. The makers claim that improved design and construction of the measuring elements, the tubing, and the bulbs in these instruments extend the field of application of the liquid-filled thermometer, making it possible to take advantage of the desirable characteristics of the Class 1 thermometer system on a greater variety of temperature measuring problems.



New liquid-filled type of recording thermometer.

The "Case-Compensated" instrument is offered in temperature ranges up to 400 deg. F. and tubing lengths up to 10 ft. or longer, depending on conditions surrounding the installation.

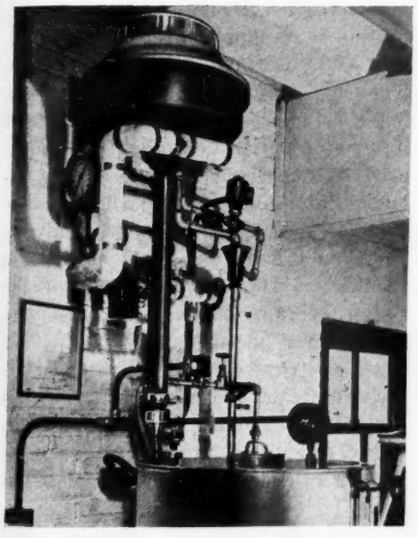
The "Fully-Compensated" thermom-

eter may be had in ranges up to 400 deg. F. equipped with 200 ft. or less of connecting tubing between the instrument and the bulb.

It is claimed that these thermometers have a higher sensitivity and accuracy. The design of the measuring element is said to be considerably stronger and more powerful than has previously been obtained. Uniformly accurate results over a wide range of change in temperature along the tubing and in the case are claimed.

Laboratory Water Still

AN IMPROVED MODEL 3-gal. capacity electrically heated water still with complete automatic control has been announced by F. J. Stokes Machine Co., Philadelphia, Pa. In this still, the automatic controls start and stop the still and maintain a fixed level of water in the storage tank, also after each cycle automatically flush out impurities from the boiling chamber.

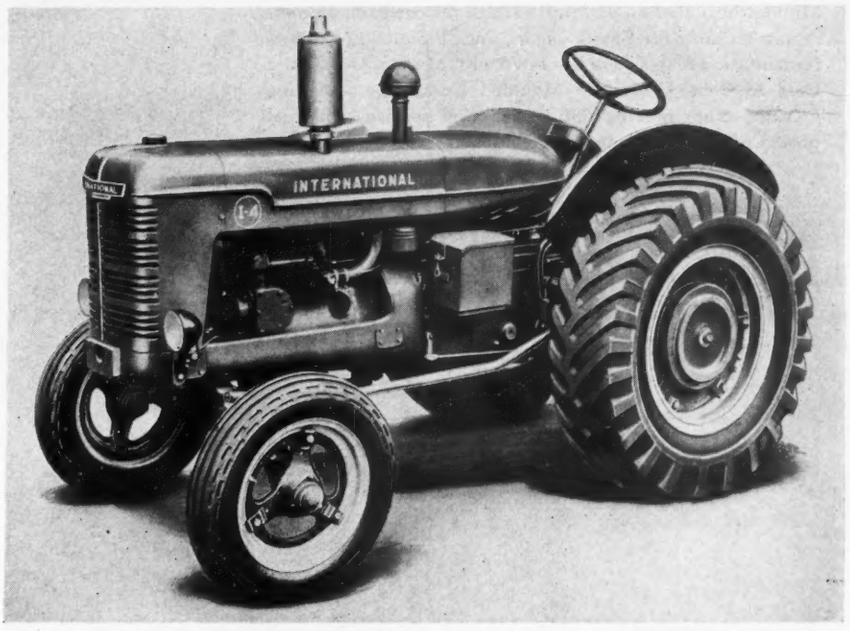


Automatically controlled laboratory water still.

The still has a heavy fast-boiling chamber and condenser housing and is so designed that formations of scale may be readily and thoroughly cleaned out. The condenser tubes are of seamless brass, heavily tinned. Other parts coming in contact with the distillate are also heavily tinned to assure against metallic contamination.

The heating element of the still has a patented built-in dual purpose thermal safety switch and combined low-water cut-off to prevent burning out from overheating in case the water supply fails or there is an excessive accumulation of scale.

The manufacturer states that this still will produce distilled water of exceptional purity, far better than U.S.P. specifications and suitable for exacting research purposes.

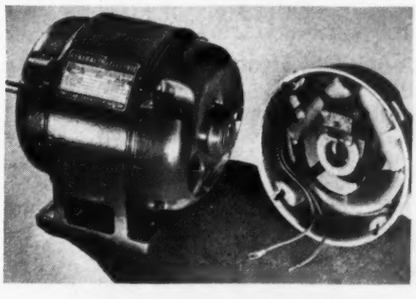


Industrial wheel-type tractor.

Tri-Clad Capacitor Motor

AS AN EXTENSION of its recently announced line of polyphase induction motors, General Electric Company, Schenectady, N. Y., is offering a new Tri-Clad capacitor motor for a number of varied industrial applications.

This motor is particularly designed for protection against both mechanical and electrical wear and tear. It may be obtained with either ball or sleeve bearings and is available in two types, Type KC and Type KCJ. The Type KC is designed particularly for applications requiring moderate starting torque such as with fans, blowers and centrifugal pumps. The Type KCJ is designed for compressors, loaded conveyors, reciprocating pumps and other applications requiring a high starting torque. The capacitors are mounted inside of the end shield on the normal torque motor, while on the high starting torque motor, 1½ hp. and larger, the capacitors are mounted in a compact case on top of the motor frame.



Tri-Clad capacitor motors, with end shield at the right of the motor showing the location of the capacitors and transfer switch.

Industrial Tractors

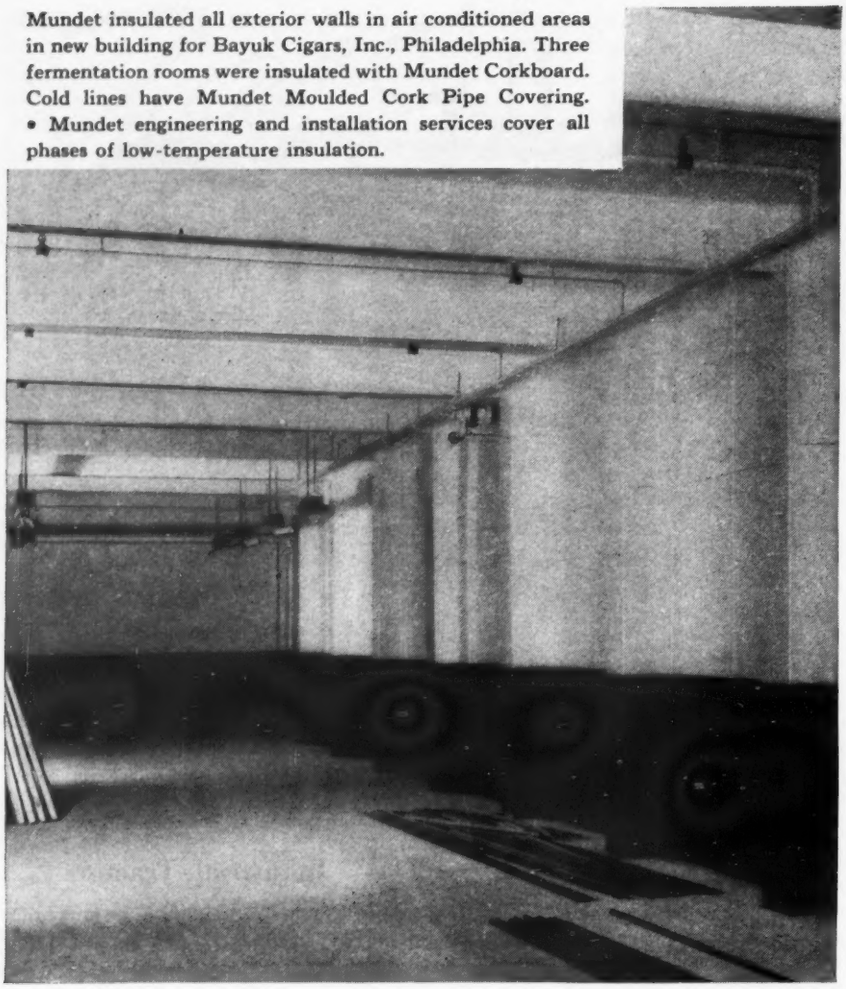
FOR PLANTS that use tractors for outdoor or heavy hauling, International Harvester Co., 180 North Michigan Ave., Chicago, is offering five new models of industrial wheel tractors. These tractors are designated as the "I" line and includes three models with carburetor type engines and two models with full diesel engines.

All the five new tractors have five forward speeds up to 15 m.p.h., except the I-6 and the ID-6 which have five speeds up to 14 m.p.h. The carburetor models are I-4, I-6 and I-9. All have engines of the four cylinder valve-in-head type. Model I-4 develops 29.5 hp., Model I-6, 40.5 hp., and Model I-9, 54 hp. The two diesel-powered tractors are respectively designated ID-6 and ID-9, the first having 38.5 hp. and the second 51.5.

Humidifier for Storage Room

A UNIT HUMIDIFIER for use in rooms where such products as fruits and vegetables are stored has been developed by Monmouth Products Co., 1929 E. 61st St., Cleveland, Ohio. The unit is of gas-fired type in which water is heated and vaporized from a shallow pan. At the same time, circulating air, caused to rise by the heat, carries off the water vapor and circulates it through the storage space. The level of the water in the evaporating pan is controlled by means of a level

Mundet insulated all exterior walls in air conditioned areas in new building for Bayuk Cigars, Inc., Philadelphia. Three fermentation rooms were insulated with Mundet Corkboard. Cold lines have Mundet Moulded Cork Pipe Covering. • Mundet engineering and installation services cover all phases of low-temperature insulation.



CLIMATE *as you want it*

TOBACCO, in its handling, is as temperamental as a debutante. That's why weather has to be made to order for the manufacture of Bayuk cigars. In the modern plant of Bayuk, air conditioning produces the exact atmospheric conditions necessary for fine cigar making. For many years, Mundet Cork Insulation has helped Bayuk to secure precise control of temperature. Mundet Cork Insulation has been specified again for Bayuk's new 5-story addition. • Mundet Cork Insulation is a dependable barrier to heat infiltration. Through its lasting efficiency the problems of temperature control are simplified; costs are reduced. For helpful data on low-temperature insulation, write today to Mundet Cork Corporation, Insulation Division, 65 S. Eleventh St., Brooklyn, N. Y.

MUNDET CORK INSULATION

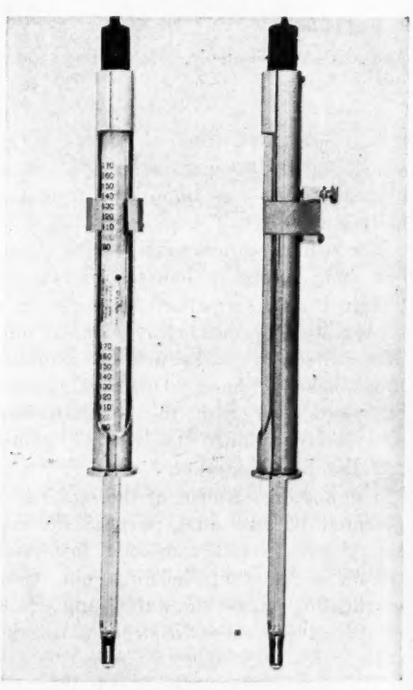
CONSERVES LOW-TEMPERATURE

controller. Products of combustion are prevented from circulation, being carried off through a duct and flue. A single unit has capacity up to 8 gal. of water per day. Automatic control is provided with the humidifier.

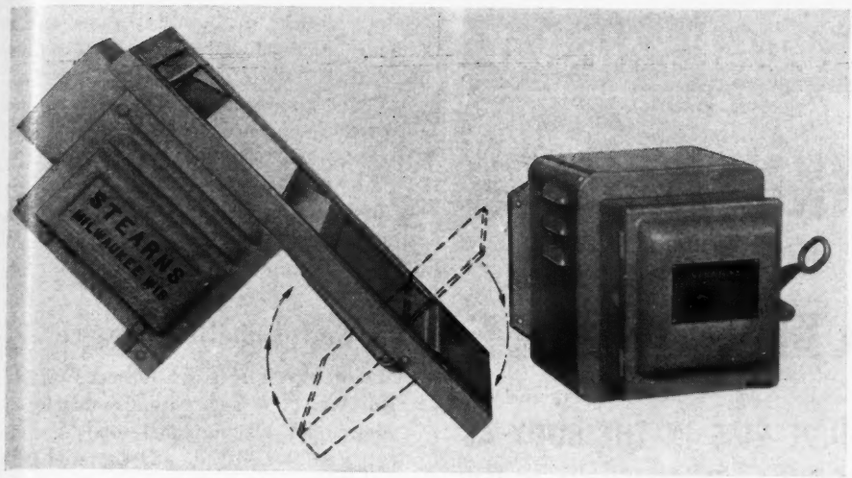
Electric Contact Thermometer

BRABENDER CORP., Rochelle Park, N. J. has developed the "Thermo-Regulator," an adjustable, electric contact thermometer for temperature control. This instrument is said to simplify temperature control in that resettings are possible with it within a few seconds. Such resettings are quickly made by simply moving the magnet to the desired temperature position.

The instrument consists of an upper (control) and a lower (mercury) column with a contact bridge located between the two columns. The lower column has exactly the same temperature reading as the upper. Within the upper tube of the instrument and movable over the entire temperature range of the upper column, is located a glass encased iron rod which is controlled by a magnet. A thin wire of definite length extends from this rod into the lower column, the end of this wire always being on exactly the same temperature reading as shown by the top of the rod in the upper column. This thin wire passes over the contact bridge. The other electrical contact is located in the lower part of the thermometer, below the mercury column. The mercury on rising establishes the contact with the thin wire thus closing the electrical



Adjustable electric contact thermometer.



Improved design of spout type magnetic separator.

circuit. When the temperature drops and the mercury withdraws again from the thin wire, the circuit is opened.

Guaranteed accuracy of this instrument is 0.10 deg. C. and it is available in two temperature ranges, from 85 to 175 deg. C. and from 30 to 200 deg. F. The instrument operates on 110 volt (25, 50 or 60 cycles), 5 to 10 milliamperes (preferably not more than 10 milliamperes). Its overall length is 15 in., the length of the stem below the sheath being 4½ in.

A suitable primary relay, passing approximately 5 milliamperes to the contact thermometer and capable of a load of 220 watts (2 amperes) can also be furnished with the instrument.

Recorder Tear-Off Device

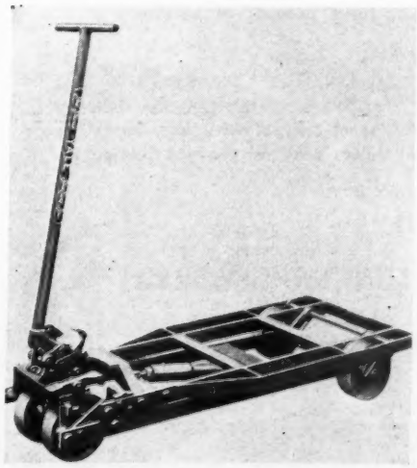
LEEDS & NORTHRUP CO., 4901 Stenton Ave., Philadelphia, Pa., has developed a device which enables users of "Micromax" strip-chart recording instruments to tear off and file a record of each day's operations. This device is designed for quick and easy attachment to the recorders. When used, there is no wasted chart and it is not necessary to re-thread the chart through the guides. A rubber stamp can be furnished to identify the recorder and the location of the thermocouple.

Improved Magnetic Separator

STEARNS MAGNETIC MFG. CO., Milwaukee, Wis., has brought out a new design of spout type magnetic separators. In the new design, parts have been simplified and fewer parts are used. Also the separator has been provided with magnets that produce a more powerful magnetic field. The magnet coils are now protected by aluminum plates provided with spacious louvres to give improved ventilation while keeping out dirt and foreign material. The former gate-operating bar has been replaced by a toggle plate which opens and closes the safety gate automatically as the current is turned on and off. Other improvements for alternating current operation include a new type of rectifier, which is said to be more compact and to have a higher resistance to damage from dust, dirt or atmospheric conditions. The new device is called the "Super Class AA" spout magnet and is furnished in sizes from 8 to 20 in. wide, operating from 110 to 220 volts current, both direct and alternating.

Simplified Hand-Lift Truck

YALE & TOWNE MFG. CO., Philadelphia, Pa., has brought out the improved "Red Streak" hand-lift truck. The feature of this truck is a simplified lift of the single-stroke type. It is said that this lifting mechanism flattens the lift curve and requires less lifting effort. Other improvements on the truck include a



Hand-lift truck with improved lifting feature.

FREE WATCH CHARM Jenkins Bros., New York, N. Y. Handsome miniature valve suitable for use as charm on watch chain. Sent without cost or obligation in response to penny postcard request addressed to Dept. TJ, 80 White Street, New York, N. Y.

AIR COMPRESSOR CHECK VALVE. Folder 191 describes and illustrates Air Compressor Check Valve Figure 56, employing an entirely new seating principle. Folder gives facts about perhaps the most severe test ever given any valve, covering seven months of grueling service; yet Figure 56 remained bubble-tight after more than 40,000,000 pulsations. Conically shaped, light weight, stainless steel disc cleans itself on every lift-and-reseating operation; spring-loaded to cushion upstroke and accelerate downstroke for immediate closure. Large-sized cutaway view in Folder 191 permits detailed examination of new seating principle and construction. Jenkins Bros., New York, N. Y.

(advertisement)

LUSTRACAST
by COOPER

(Electrolytic Polish)

Stainless Steel
CASTINGS
Fittings • Valves

Improve **the quality of your stainless products with COOPER "Lustracast" Stainless Steel Castings, Fittings, Valves.**

The exclusive "Lustracast" process gives COOPER products a brighter, CLEANER, more passive surface which in turn increases the practical utility, life and saleability of your products.

Investigate these definitely BETTER Stainless Castings, Fittings, Valves.

The COOPER
Alloy Foundry Co.
Elizabeth, N. J.

DISC GUIDING GOES MORE THAN HALF-WAY

in LUNKENHEIMER
IRON BODY
GATE VALVES

THE GUIDE RIBS IN THE BODY AS WELL AS THE GUIDE CHANNELS IN THE DISC ARE ACCURATELY MACHINED.

No half-way measures go in manufacturing Lunkenheimer Iron Body Gate Valves. With disc guiding, for example, not only are the guide channels in the disc accurately machined, but *the guide ribs in the body as well* — to extremely close tolerances.

With this thorough method of disc guiding, thrust of the disc is always against guides and not against seat faces. Chattering and dragging on seats are eliminated assuring tight closure and longer seat and disc life. Fewer repairs and replacements are necessary, materially reducing maintenance expense, with resultant lower valve cost.

Lunkenheimer Iron Body Gate Valves also embody many other refinements which place them in a class above ordinary gate valves. Exceptionally heavy bronze seat rings; disc of true solid construction; new development in stem bronze with its extra resistance to wear; non-corrosive bearings at all points; uniform interchangeability of parts; dense sound castings of great strength; all of these features mean savings for the user in time and money over long periods of service.

For full information on the complete line of Lunkenheimer Iron Body Gate Valves send for copy of Catalog 78.

ESTABLISHED 1862
THE LUNKENHEIMER CO.
"QUALITY"
CINCINNATI, OHIO, U. S. A.
NEW YORK CHICAGO
BOSTON PHILADELPHIA
EXPORT DEPT. 318-322 HUDSON ST., NEW YORK

Buy from your local Lunkenheimer distributor! He is co-operating in every way to give you the kind of service you so vitally need for the National Defense Program.

6-82C-11

safety feature to prevent tripping and a handle balancing mechanism which keeps the handle in an upright position. Another feature is a balanced handle, welded into a single unit to keep parts from working loose.

Capacity of this hand-lift truck is 35,000 lb. and, to enable it to operate in cramped quarters, it features a 90-deg. lift and full 180 deg. steer.

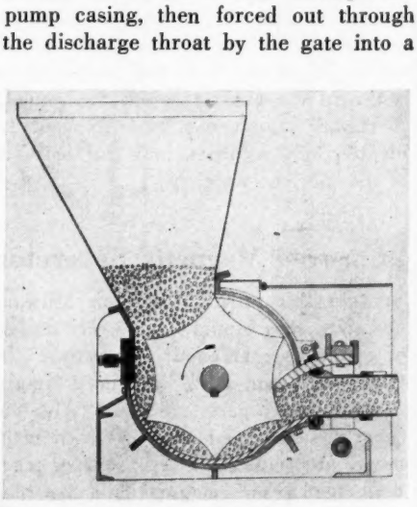
End Labeling Device

AMERICAN MACHINE & FOUNDRY CO., 511 Fifth Ave., New York City, has developed a device for placing labels on the ends of a loaf of bread. Designated the "A.M.F. End Labeler", this device is designed for use on the 16-in. A.M.F. standard wrapping machine. It is built into the wrapping machine and the manufacturer states that it is completely synchronized with the wrapping machine at any speed. Labels are fed from a continuous label web of approximately 9,000 labels. The labels have a heat-seal compound which adheres to the end of the loaf because of the heat of wrapping paper when it comes from the sealing zone.

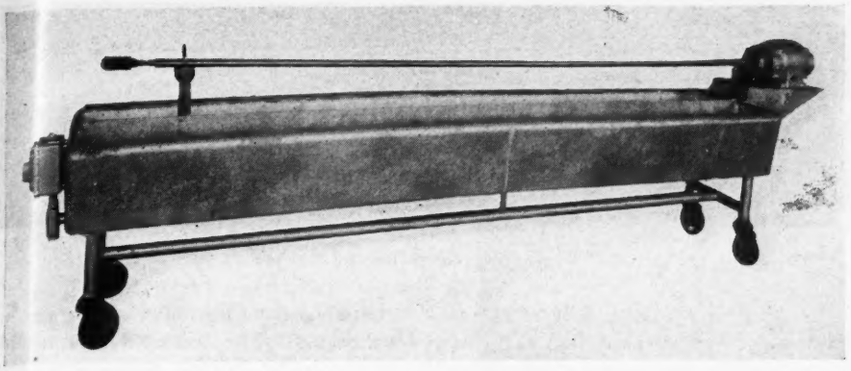
Pump for Granular Materials

ROTOGATE PUMP CORP., 600 S. Michigan Ave., Chicago, has developed a slow-motion rotary pump, called the "Rotogate". This pump is for the transportation of any materials of a fluid, semi-fluid or granular nature that can be forced through a pipe.

In construction there are only two parts that come in contact with the material being handled: a pocketed rotor and a gate or cleaning device. In operation, the semi-fluid materials placed in a hopper are picked up by the pocket in the rotor and carried through the pump casing, then forced out through the discharge throat by the gate into a



Rotary pump for handling dry granular, semi-fluid or fluid materials.



Sanitary cleaner for food plant pipes.

pipeline. Discharge is positive and continuous, the capacity being always the same for each revolution whether the rotor turns at one revolution or ten revolutions per minute.

At present these pumps are being built to handle such materials in capacities of 20 to 60 cu.yd. per hr., though smaller pumps can be built. Also, the pumps can be built of corrosion-resistant materials if desired. They are easily cleaned with steam, having no sharp corners for materials to lodge in and are equipped with pure rubber gaskets when used for handling food products. An advantage claimed is the fact that the slow movement of the rotor prevents breakage of the material being handled.

Pipe Cleaner

A DEVICE for simplifying the cleaning of pipe, called the Nemco Sanitary Pipe Cleaner, has been announced by the National Electric Manufacturers Co., 60 E. 42nd St., New York City. This machine consists of a ¼ or ½ hp. motor mounted on a 10-ft. galvanized tank. The motor drives a solution feed shaft made of Monel. The outer casing is 1¼ in. in diameter and within this is used another Monel heavy-walled tube which is the power shaft. This shaft is suspended by Oilite bearings held in place by bronze spacers anchored at the ends of the shaft. The bearings are placed 2 ft. apart and are kept cool by the solution feeding to the brush.

In operation, the cleaning solution is fed through the power shaft to a rotating spray reversible brush. Provision is made for re-using the solution from the wash tank by means of a small circulating pump placed under the motor base. The solution sprays out of the holes in the brush so that the rotating action of the brush is always being fed with cleaning solution. By means of a two-way valve, clean water for rinsing can be used in place of the cleaning solution.

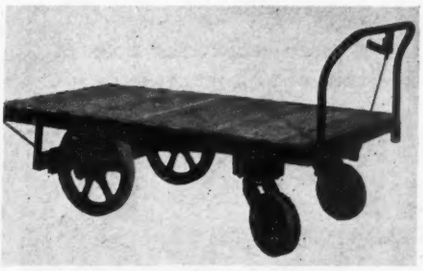
The manufacturers claim that this new design eliminates flexible or rigid power shafts as used with an older design which had no bearings to support the power shaft. In such cases the resulting sagging caused a whip that vibrated the entire shaft, creating noise and wear on the outer shaft and the brushes as well as the motor bearings. In the new design, the entire pipe cleaning shaft is flexible insofar as the motor is concerned, being connected to the motor by means of a special rubber-treated motor coupling.

Warehouse Truck

A WAREHOUSE TRUCK equipped with a brake for safety in operation has been brought out by Service Caster & Truck Co., Albion, Mich. This is particularly for service where floors are slightly inclined or material must be brought down ramps. Brake is employed when loading and unloading, and for killing the momentum of heavily loaded trucks preparatory to stopping, particularly in spots where space is limited.

This truck is of heavy construction with a 36x72 in. deck of hard maple. Height from the floor to the deck is 19⅛ in., from the floor to the top of the handle is 38 in. Rubber-tired wheels are 18x2½ in. revolving on Hyatt roller bearings. Small wheels are 10x2½ in., made of Textolite, equipped with Hyatt bearings and swung on double ball bearing swivel caster rigs.

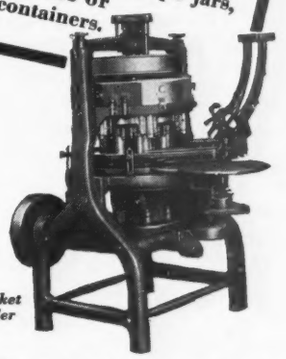
In braking, a lever located just under



New service warehouse truck.

YOU PREPARE IT... WE'LL FILL IT!

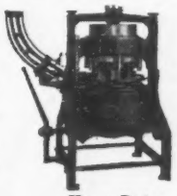
The Sky's the Limit! No matter what the nature of your food products —pulps, liquids, pastes, soups, potted meats, syrups, etc., etc. — there are FMC Fillers designed to fill them *at top speed* with unerring precision into any size or shape jars, cans, bottles or other containers.



M & S 6-Pocket Plunger Filler

• This M & S 6-Pocket Plunger Filler, for example, is an extremely versatile machine that handles any liquid or semi-liquid product and fills any size or shape container.

The Heavy Duty Plunger Filler, below, is a positive measuring, plunger type machine built to meet the needs of year 'round canners. Easily adjustable for various size containers, this machine will operate continuously for from 20 to 24 hours a day without interruption.



Heavy Duty Plunger Filler

NO SPOILAGE OR WASTE

Unless a container is in position under the nozzle, none of the product will be released.

SPEED

These 6-Pocket Fillers will fill up to 125 average size containers a minute. Other FMC Fillers are available with capacities up to 250 or more containers per minute.

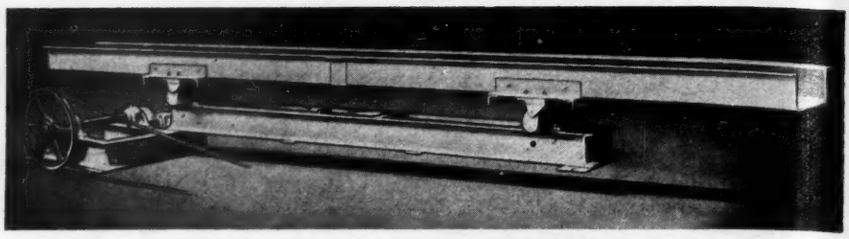
Mail the coupon Now for information on the complete line of FMC Fillers!

FOOD MACHINERY CORPORATION F-601-FI
(Sprague-Sells Division) Houpeston, Illinois

Please send complete information on Fillers contained in your New 1941 Catalog.

Product to be handled_____
Sizes and kinds of containers_____
Speed required_____
Name_____
Company_____
Street_____
City_____ State_____

the handle, is pushed down and a cam action tightens the cable, setting the brake bar. Braking is accomplished by hardwood shoes against the rubber tires. By pulling upward, the brake is released. Adjustments may be made by turning a single nut.



Vibrating conveyor and feeder.

Vibrating Conveyor Feeder

A NEW VIBRATING CONVEYOR and feeder known as the "Free-Flow" has been introduced by Standard Transmission Equipment Co., 416 W. 8th St., Los Angeles, Calif. This equipment operates on the "Lift-Throw" principle, with the motion of the trough becoming increasingly horizontal with the progress of each cycle, thus imparting to the conveyed material a gentle forward motion. The motion is designed so that it suspends the mass of material being moved in the air with only momentary contact with the trough during the upward period. It is said that suspended float-action minimizes wear from abrasion and that even very fragile materials can be conveyed without fear of breaking.

The trough of the free-flow conveyor is self cleaning and it makes use of no chains or flights. Because of this, different materials can be conveyed one after the other without fear of contamination. The vibration of the conveyor is produced by oscillating arms mounted in rubber bushings. Self-aligning precision ball bearings are used throughout. Volume conveyed is controlled by means of control of the rate of oscillation. Material can be moved up inclines as steep as 15 degrees.

Temperature Indicator

A THERMOCOUPLE TYPE INSTRUMENT of portable type for measuring temperatures, for checking thermocouples or for measuring small e.m.f's, has been developed by Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, Pa., under the designation of No. 8667 indicator. It is said that this potentiometer instrument gives increased accuracy because only a small portion of the range on a continuously adjustable slide wire is calibrated. The remainder, adjustable in six steps, is on a dial switch of 10 accurate resistors. The range is from 0 to 111 millivolts with a limit of error of ±0.1 millivolts. This instrument is said to be completely self-contained, light and compact, and easily portable.

Packaging Materials

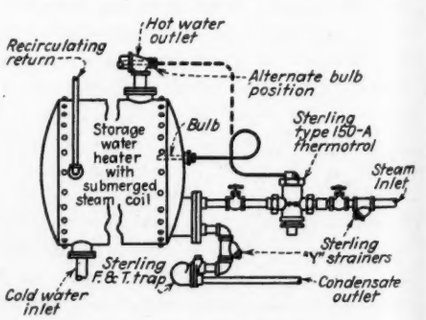
B. F. GOODRICH CO., Akron, Ohio, has recently developed a transparent packaging film made from their synthetic plastic "Koroseal". This film is resistant to outside exposure—sunlight, oxygen, and extreme changes of temperature. In addition it is extremely resistant to the passage of moisture. It is made in a variety of colors in transparent, semi-transparent, translucent and opaque forms, and is produced in gages ranging from one-thousandth inch, up.

Heater Regulator

STIRLING, INC., 3738 N. Holton St., Milwaukee, Wis. has brought out a direct-acting thermostatic control for tank and process heating applications. Among the applications indicated for this device are on the steam supply to steam-heated water storage tanks, stills, pasteurizers, bottle and can washers, drying ovens, cookers, scalding vats and similar equipment.

The device consists of a thermostatic bulb for installing the equipment to be controlled, connected by a flexible tube to a control valve placed in the steam line.

This control comes in two types, No. 150A for pressures from 0 to 30 lb.; and



Typical installation of thermostatic control for heating equipment

METSO CLEANERS SUSPEND DIRT!

USERS of Metso Cleaners know they choose wisely because of the efficient cleaning they get. The results are explained by a scientific balanced combination of alkali and soluble silica in Metso.

Metso Balanced Cleaners do more than remove grease and oil—they hold the removed dirt in suspension, preventing its re-settling on the cleaned surface. That's what is called "suspending dirt".

May we tell you more about the role of silica in Metso Balanced Cleaners?

SODIUM METASILICATE
U. S. PATENT 1898707

PHILADELPHIA QUARTZ COMPANY

EST. 1831

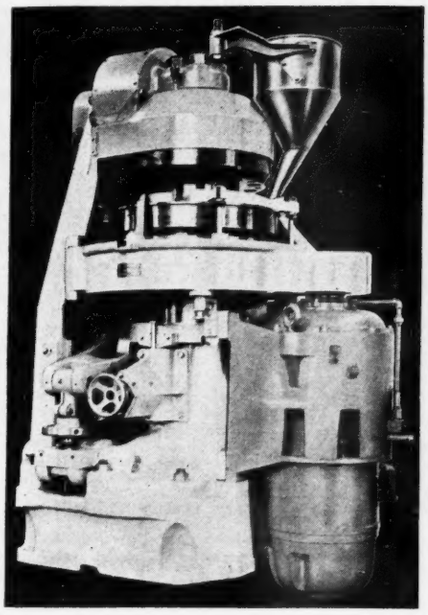
General Offices: 125 S. Third St., Phila., Pa. Chicago Sales Office: 205 W. Wacker Drive. Stocks in 60 cities. Sold in Canada by National Silicates Ltd., Toronto.

METSO CLEANERS

No. 150AH, stainless steel finish, for pressures from 0 to 125 lb. Both models, called Thermotrols, are available for pipe sizes as follows: ½ in., ¾ in. and 1 in.

Large Tablet Machine

F. J. STOKES MACHINE CO., Philadelphia, has developed a new large rotary tablet compressing machine capable of applying 30 tons pressure and producing tablets up to 2½ in. diameter. This is a direct motor-driven machine through a geared speed reducer. It has an output up to 150 pieces per minute when the full number of ten punch and die sets are in use. Lower production is possible by using fewer sets of punches. In the food industries, this machine is particularly used for producing large tablets or blocks of salt.



Large tablet machine for making bulk tablets and similar materials.

Maintenance Paints

S. C. JOHNSON & SON, INC., Industrial Maintenance Division, Racine, Wis., has announced a new line of maintenance paints for use in factories and other buildings, known as Johnson's Wax-Fortified Paints. The impregnation of these paints with wax particles is said to produce a finish that is difficult to mar and easy to clean, and consequently, to provide reduced maintenance cost. The paints included in this new line are: mill white gloss, mill white flat, commercial interior gloss, commercial interior flat, transportation enamel, undercoat for Johnson's Wax Fortified Paint, and primer for Johnson's Wax Fortified Paint.

*Electricity at 1c per kilowatt-hour**—a reduction of one-half to three-fourths the usual cost through other sources! That's the possibility brought to you by modern "Caterpillar" Diesel Electric Sets—a development by the world's largest manufacturer of Diesel engines. "Caterpillar" Diesel economy is being proved in hundreds of installations, in all sorts of establishments now making their own electricity with these completely self-contained, self-regulating, independent power-plants. For instance:

- A Massachusetts service station lops $75 a month off its electricity cost—and heats buildings besides.
- An ice-plant operator in Georgia estimates his annual saving at $1565, as compared with purchased power formerly used.
- A whole community in Oregon (21 residences, 4 stores, 1 hotel, and an auto camp) makes its own electricity on less than a gallon of 10c fuel an hour.

If *your* electric bills run $50 or over per month and you are paying 2 cents or more per kilowatt-hour, you can slash the cost with one of these economical, dependable, long-lived "Caterpillar" Diesel Electric Sets. MAIL THE COUPON.

*Slightly more or slightly less, depending on average load and local price of fuel.

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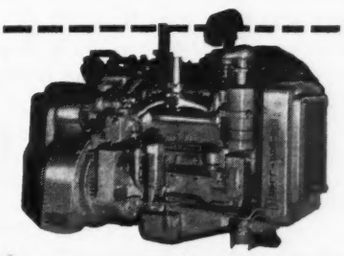

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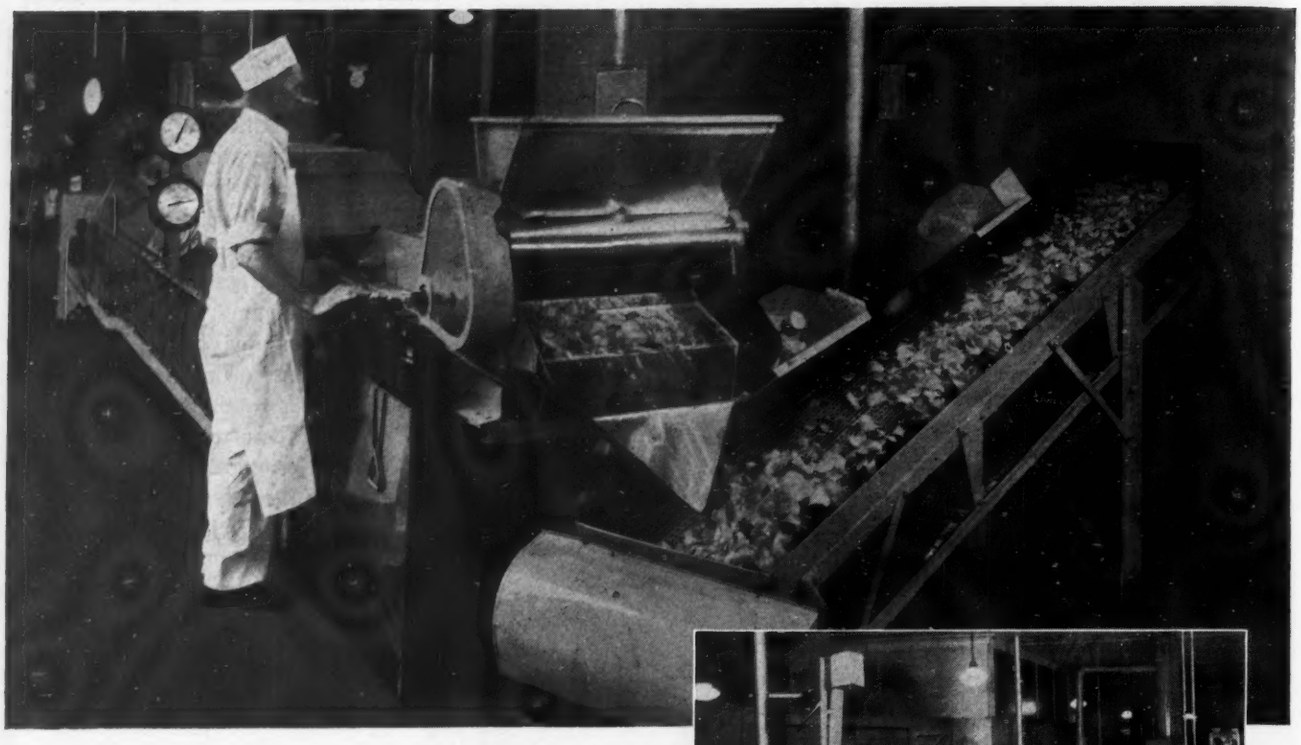
Address_____

My present power is costing about $_____ a month.

I require about_____kw. per hour for_____
(State kind of business)



The Chips Roll Out and Consumer Satisfaction Rolls in for

WOLVERINE POTATO CHIP CO.

"Proof of the pudding" is best expressed in the words of a satisfied customer . . . "Our Ferry machine is working at capacity most of the time and our production costs for top quality chips are far lower than by our old method" . . . So writes Mr. Joseph Wozniak, president of Detroit's Wolverine Potato Chip Co.

In this up-to-date plant they are operating a special Model B

FERRY AUTOMATIC CONTINUOUS POTATO CHIP MACHINE

—a type that produces from 225 to 250 pounds of finished chips per hour—And every pound is premium quality . . . No rancid chips, no burnt or soggy chips. They're all uniformly golden brown, crisp, tender and salted to the queen's taste . . . Two operators only are required for this high-capacity machine—one to feed the peeling unit and the other to inspect the finished product—all operations are automatic and continuous.

WRITE US TODAY FOR FULL PARTICULARS—If you are in the potato chip business to make money we can show you the way to broaden your market and increase your profits. Bulletin F.I. will give you the facts and figures—write for it today.

J. D. FERRY COMPANY

129 S. CAMERON ST. **HARRISBURG, PA.**

Just off the Press

BOOKLETS · LITERATURE · BULLETINS

Food Plant Equipment

Base Plates

A line of welded steel base plates for adjusting pillow blocks and common flat boxes for shaft alignment has been published as 8-page booklet No. 1882, by Link-Belt Co., 307 N. Michigan Ave., Chicago, Ill.

Fluorescent Lighting Fixtures

Designed especially to furnish higher illumination intensities for industrial plants, 100-watt fluorescent luminaires are described in a 4-page leaflet F-8604, announced by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Cold Diffusers

Room cooling equipment for such uses as the refrigeration of cold storage spaces is described, in four different types, in four separate publications of Carrier Corporation. Syracuse. N. Y.

Elevating Equipment

Simple equipment for effecting elevating and lowering operations in the lifting, loading and unloading of goods is described in a recent leaflet of Walker Mfg. Co., Racine, Wis.

Ladders

Safety ladders of both aluminum and wood construction are discussed in two recent bulletins of Duo-Safety Ladder Corp., Oshkosh, Wis.

Materials Handling Equipment

Conveyors for use in handling bottles and cases of bottles in milk and carbonated beverage plants and breweries are the subject of three illustrated bulletins just issued by Lamson Co., Syracuse, N. Y.

Motor Starters

Full voltage starters for induction motors are described in Bulletin GEA-841K of General Electric Co., Schenectady, N. Y.

Pumping Equipment

In Bulletin W-325-B1, the single-stage condensate pump, Type JZ, for hot-well, condensate, chilled water and general service is described by Worthington Pump & Machinery Corp., Harrison, N. J.

Speed Changing Equipment

The speed "Variator", an all-electric adjustable speed drive operating from a.c. supply is the subject of Bulletin GEA-3517, General Electric Co., Schenectady, N. Y.

Testing Equipment

Testing sieves and the "End-Shak" testing sieve shaker are described with specifications in a brief illustrated folder published by Newark Wire Cloth Co., 351 Verona Ave., Newark, N. J.

Vacuum Equipment

Single-stage and two-stage steam jet ejectors for the production of vacuum are described in Bulletin W-205-B6B and W-205-B8, respectively, by Worthington Pump & Machinery Corp., Harrison, N. J.

Valves and Fittings

A full line of cast steel valves and fittings is described with specifications in Catalog No. 332 published by Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Reading, Pa.

Variable Speed Drive

"Magnetic Variable Speed Drive" is the title of a 12-page publication, describing magnetic variable speed drives for use between motors and machines, issued by Electric Machinery Mfg. Co., Minneapolis.

Vibrating Equipment

Vibrating conveying equipment and vibrating screen equipment installations are illustrated in Bulletin No. 31, issued by Ajax Flexible Coupling Co., Equipment Division, Westfield, N. Y.

Packaging

Packaging Equipment

Machinery for packaging candy, cereals and similar products in transparent wraps is described, and many of the products so packaged are illustrated, in a folder called "The ABC of the Transwrap Package" issued by Stokes & Smith Co., 4943 Summerdale Ave., Philadelphia, Pa.

Plant Supplies

Ammonia

A 16-page booklet covering such subjects as the chemical and physical properties of liquid anhydrous ammonia, including curves on pressure and temperature relations, data on density of liquid ammonia, and information about containers and their safe handling, piping and valves and first aid measures in case of exposure, has been issued by Mathieson Alkali Works, 60 E. 42nd St., New York, N. Y.

Bactericide

"Perchloron," a high test calcium hypochlorite, and its use as a bactericide for the sterilization of food processing equipment and plants, is described in a 32-page catalog entitled "Perchloron Data Book No. 2," published by Pennsylvania Salt Mfg. Co., 1000 Widener Building, Philadelphia.

Chemicals

Over 80 new esters of polyhydric alcohols and their ethers are described in a recent bulletin of Glyco Products Co., 148 Lafayette St., New York.

Emulsifying Agent

A new emulsifying agent. Emulgor-A, which will give emulsions of various types of oils, waxes, hydrocarbon solvents and other products, is described in a circular issued by Glyco Products Co., Inc., 148 Lafayette St., New York.

Protective Coating

A recent booklet describing "Parlon," a rubber-chlorine base for protective coating, including Parlon-base paint for concrete and metal surfaces and enamels fortified with Parlon for finishing equipment, has been issued by Hercules Powder Company, Wilmington, Del.

Synthetic Rubber

A detailed description of the properties of "Ameripol," a synthetic rubber which can be obtained in compounds that are practically odorless and tasteless, is the subject of a bulletin just issued by B. F. Goodrich Co., Akron, Ohio.

Control Equipment

Photoelectric Relay

In Bulletin GEA-3533, photoelectric relays for counting, diverting, controlling, signalling, limiting and other operations are described by General Electric Co., Schenectady, N. Y.

Thermometers

The 1941 edition of the complete catalog of industrial thermometers, a 72-page illustrated book, has been issued by the Instrument Div., Manning, Maxwell & Moore, Inc., Bridgeport, Conn.

Laboratory Equipment

Laboratory Apparatus

In a 184-page illustrated catalog, a complete line of laboratory instruments and apparatus for chemical, biological, physical and other laboratory work is described by American Instrument Co., Silver Spring, Md.

OF *Interest and Value* TO ENGINEERS AND TECHNICAL MEN!

A COMPLETE TABULATION OF STAINLESS STEEL ANALYSES

Through constant research, experiment and specialized attention to the particular needs of the process industries, Globe Stainless Tube Co. has acquired a valuable fund of engineering and metallurgical data. We are prepared to furnish comprehensive information to chemical, food, paper, oil, and other process industries on the service to be expected from stainless steel tubes of varying analyses.

Globe Stainless Tubes, including corrosion and heat resisting seamless tubing and pipe are available in a wide range of chrome and chrome-nickel alloys. These tubes are in use on some of the largest industrial installations — are the choice of leading equipment makers. Write for "Analyses Chart" Bulletin I-G —a complete tabulation of stainless steel analyses as produced by various manufacturers.

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BOILER TUBES
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Stainless for Security
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Food Technology

NEW DISCOVERIES & INVENTIONS

BEVERAGES

Processing Apple Juice

DIFFICULTY in retaining the delicate apple flavor through sterilizing processes prevented any commercially successful canning or bottling of apple juice until 1935. Sterilization without heat, by use of the Seitz germ-proof filter, has given some success, but this method is less popular in America than in Europe. Flash sterilization in Monel metal tubes, flattened for part of the tube length to increase rates of heat transfer and liquid flow, permits pasteurization without loss of flavor and without caramelization. A temperature of 170 deg. F. is recommended in commercial practice. This allows a margin of safety, since pasteurization at 160 deg. F. is effective, yet conserves juice quality better than would a higher temperature. The hot juice is passed directly to non-sterile bottles or cans.

Since plain tin plate rapidly fades apple juice and impairs its quality, the cans must be enameled, and they are best filled from the bottom to avoid aeration and foaming. Cooling should be very prompt after sealing the container. Comparative tests do not indicate that deaeration is highly important to successful processing. Clarification is justified only if consumer demand calls for a clear juice. Filtration is slow and difficult. Enzyme clarification is effective but somewhat expensive.

Digest from "Processing of Apple Juice," by Roy E. Marshall, *Industrial and Engineering Chemistry* **33**, 285, 194.

Problems of Aluminum in Solution for Washing Bottles

SINCE free sodium hydroxide has the highest germicidal potency among the alkalies used in bottle-washing solutions, the total alkalinity of a solution is not a sufficient criterion of its sterilizing power. The sodium hydroxide content must also be known; and if it is converted during use to milder alkalies, proper allowance should be made for the change.

The recent advent of aluminum bottle labels introduces a new problem since these labels react with sodium hydroxide to form sodium aluminate, thereby impairing germicidal power. As an example, a 2 percent sodium hydroxide solution which killed 99.9 percent of suspended *Bacillus metiens* spores in 46 minutes at 122 deg. F. took 80 minutes to produce the same effect after three-eighths of the free sodium hydroxide had been converted to sodium aluminate. Since continued use of a solution for washing aluminum-labeled bottles would tend to build up a high aluminate concentration and lower the free hydroxide content accordingly, exact control of bottle-washing solutions takes on new importance. Tropeolin-O, an indicator commonly used for titrating bottle-washing solutions, becomes inaccurate in this case because it permits all above a small concentration of sodium aluminate erroneously to appear in the titration as free sodium hydroxide. A more accurate indicator for this purpose is sodium indigo disulfonate, which correctly indicate the concentration of free sodium hydroxide in the presence of sodium aluminate, and thus permits prompt detection of impairment in sterilizing efficiency.

Digest from "Effect of Aluminum on Germicidal Efficiency and Determination of Causticity of Washing Solution for Refillable Glass Containers," by C. A. Shillinglaw and Max Levine, *Proceedings of the First Food Conference*, Institute of Food Technologists, **59**, 1940.

How To Make Pink California Wines

ONLY SMALL AMOUNTS of pink wine are produced in California. Systematic production would introduce a new type of wine to the market. Grapes now used for red wines could be utilized by practicing familiar expedients for reducing color, especially by early picking and by pressing the grapes promptly after crushing. Pink wines can be made in this way from Petite Sarah, Carignane and Mataro grapes. The Zinfandel (leading red wine grape in California) ripens irregularly so that it is difficult to time the picking, but if picked early enough to avoid raisining, Zinfandel could probably be fermented to pink wines successfully.

Another expedient which is common in European practice is to use light-colored grapes which produce pink wines without special treatment. Nebbiolo, Lambrusche and Mammolo grapes (Italian varieties) yield fruity, light-bodied, rather tart pink wines. They are well adapted to California conditions. The Pinot Noir, sometimes used to make white wines, can be used for pink wines if picked late instead of early. For pink dry wines Grignolino, Aramon and Grenache are suitable varieties. Aramon is a highly productive grape, ideal in color content but low in alcohol content. It could serve best in blends with more alcoholic wines.

In general, early pressing reduces extract content, tannin content and color as compared with wines fermented on the skins. Pink wines have much higher brightness than red wines, but less color purity. Their dominant wave length is about 40 millimicrons lower than that of red wines. Numerical tables show the results of numerous test fermentations in production of pink wines.

Digest from "Color in California Wines, IV. "Production of Pink Wines," by Maynard A. Amerine and A. J. Winkler, *Food Research* **6**, 1, 1941.

DAIRY PRODUCTS

Common Defects of Ice Cream, Their Causes and Control

A REVIEW

A 30-PAGE UNCRITICAL REVIEW of 155 papers, and not capable of being abstracted here in a way to be of any real value.

By P. S. Lucas, *Journal of Dairy Science* **24**, 339, 1941.

Thermoduric Bacteria In Pasteurized Milk

MILK pasteurized by the short-time, high-temperature method (16 seconds at 161 deg. F.) shows greater bacterial counts than that pasteurized at 143 deg. for 35 minutes. The number of acid-formers is the same in both, but alkali-formers are far more numerous in the short-high pas-

teurized milk. This had not led to complaints of the milk not souring normally. These thermoduric bacteria are predominantly micrococci of various types. They are common in the udder and are the predominant flora of dirty milking machines, strainers, pails and cans on the farm. They are harmless, but since boards of health still insist on count, rather than kind, of bacteria, milk handlers must deal with them.

Digest from "Thermoduric Bacteria in Pasteurized Milk. II. Studies on the Bacteria Surviving Pasteurization with Special Reference to High-Temperature, Short-Time Pasteurization," by J. L. Hileman, Henry Leber and M. L. Speck, *Journal of Dairy Science* 24, 305, 1941.

Frozen Homogenized Milk

HOMOGENIZED MILK, which is becoming increasingly common in bottled form, behaves differently from ordinary fluid milk when frozen. It freezes slightly more rapidly than unhomogenized milk—about 3 percent faster for the higher homogenization pressures (2500-3500 lb.). The frozen portion is poorer in fat and solids-not-fat than the remaining liquid, while with ordinary milk the frozen portion is richer in fat and poorer in solids-not-fat. With either type of milk the titratable acidity is higher in the unfrozen part, roughly paralleling the solids-not-fat content. Frozen homogenized milk does not show flakes on thawing but does show a watery appearance on the surface layer. The fat and solids-not-fat of homogenized milk tend to settle in the lower half of the bottle on thawing, particularly if this is done slowly.

Digest from "The Freezing and Thawing of Milk Homogenized at Various Pressures," by G. M. Trout, *Journal of Dairy Science* 24, 277, 1941.

Cream Body

WASHED CREAM (cream diluted with water and re-separated from one to five times) has a much lower viscosity than normal cream, either raw or pasteurized. Winter cream is more viscous than that from cows on pasture, probably owing to a greater content of higher melting point fats. Heat treatment (reheating, holding and recooling) increases body, so much so on winter creams that they become gel-like. Repeated pouring of cream from one bottle to another lowers the viscosity, although fat-globule clumping is unchanged. The heavy body of cream produced by aging for 24 hours or by heat treatment is due to the formation of a definite temporary structural condition.

Digest from "Some Factors Affecting the Body of Market Cream," by F. M. Skelton and E. O. Herreid, *Journal of Dairy Science* 24, 289, 1941.

FISHERY PRODUCTS

Preserving Fish

INCORPORATING ANTISEPTICS such as ozone, hydrogen peroxide or benzoic acid in ice for icing fresh fish is not an effective aid to preservation, but crushed ice containing as little as 0.1 percent sodium nitrite is remarkably potent. While sodium nitrite remains in the liquid phase when its solutions are frozen, it is possible to conduct the freezing so that sufficient nitrite is occluded in the ice. Of the many chemical preservatives which have been tried, some are ineffective and others seriously impair the color, odor or flavor of the fish. For preserving fillets it has been found that immersion for about 5 minutes in a brine containing 0.1 to 0.6 percent sodium nitrite (depending on size and fatness of the fillets) greatly retards bacterial spoilage. The brine is kept at 32 to 35 deg. F. for treating fillets in this

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One of the outstanding design features of Lipman Refrigerating Machines is the high oil level in the crankcase. This distinctive Lipman feature provides an extra margin of safety in two ways:
First: It completely submerges the crankshaft in oil, assuring positive lubrication of vital working parts at all times, prolongs their life indefinitely, eliminates the need for servicing, does away with costly shutdowns.
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way. Lactic and citric acids have some preservative effect on fish but cause certain undesirable physical changes.

Exposure to ultraviolet light partially sterilizes freshly cut fillets, but the rays have very little penetrating power and do not have much effect after the bacteria have had time to penetrate under the surface. Brine can be sterilized by ultraviolet irradiation, but keeping quality of the treated fish is apparently not much improved by the sterilized brine.

Digest from "Use of Chemicals and Ultraviolet Light in Preserving Fish," by H. L. A. Tarr, *Proceedings of the First Conference*, Institute of Food Technologists, 1940, p. 145.

Yellow Discoloration of Canned Oysters is mainly Carotene

CANNED OYSTERS slowly develop a yellow color in the area surrounding the liver. Packers have considered this discoloration to be a blemish which might result in sales resistance, especially since the public is becoming more and more critical of off-flavors, off-odors and off-colors in food products. The origin and nature of the yellow discoloration have therefore been systematically investigated, using the spectrograph for separation of color principles from discolored oysters and from oyster livers. It was found that the yellow pigment is mainly carotene. Therefore, it would be undesirable to destroy it because of the resulting loss in vitamin A value. Diffusion of the pigment from the liver into surrounding tissue can be inhibited by low-temperature storage, a temperature of 0 deg. F. being effective in preventing discoloration.

Digest from "A Study of the Yellow Discoloration of Canned Oysters," by E. W. Harvey and C. F. Shockey, *Proceedings of the First Conference*, Institute of Food Technologists, 1940, p. 181.

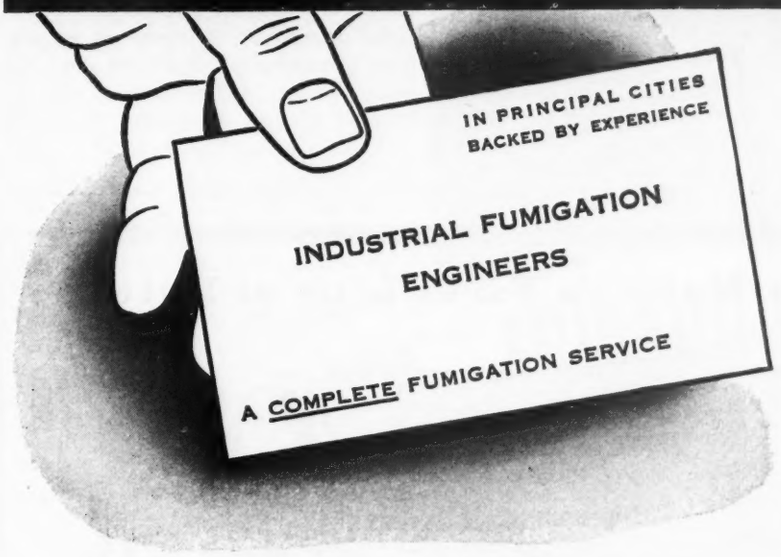
MEAT PRODUCTS

Gas-forming Organisms in Meat

CERTAIN SPECIES of the genus Bacillus ferment sugars with copius evolution of gas in the presence of nitrate and cured meat. Spices commonly carry spores of such organisms and may be the source of contamination in spiced meats. Wrapping papers may also carry the spores. No gaseous fermentation occurs in standard sugar broths, but in presence of nitrate : sugar : pork mediums, carbon dioxide is copiously evolved by these bacilli. Some strains can also produce gas in sugar : nitrate broths containing 10 mg. of vitamin B_1 per liter instead of meat. Nitrate is apparently essential to gas production by these bacilli.

The gas-forming organisms can be

OUR CARD
Mr. Production Manager



HERE are the reasons why an Industrial Fumigation Engineer can give you more complete insect and rodent control and *save you money at the same time.*

From long experience with all types of infestation, under varied conditions in every type of food plant and flour mill, he can recommend the most efficient, the most economical method of control for *your* plant.

A complete survey of your premises by an Industrial Fumigation Engineer may indicate the installation of a special piping system and fumigation with Liquid HCN at specified intervals. Or, he might advise that your product be fumigated in a special room at a certain stage of production. In another situation he may suggest fumigation under a vacuum.

The Industrial Fumigation Engineer can make such specific technical recommendations—and can and will carry them through to a complete solution of your entire problem—because he knows fumigation and how to use it most economically and effectively... he provides trained workers... he protects you with liability insurance ...and he makes periodic inspections to assure you of complete pest control at all times.

We will gladly send you the name of the Industrial Fumigation Engineer nearest you. He will, if you wish, survey your plant and report his findings, recommendations and an estimate of costs—without any obligation to you.

Liquid HCN is used extensively for insect control in modern food and milling plants. It saves in time and cost compared with other methods. Food manufacturers in many fields now obtain complete, all-year control by consistent fumigation with Liquid HCN. Write for further details.

HOW ONE PLANT * CUT FUMIGATION COST BY 33%

• The counsel of an Industrial Fumigation Engineer saved a large midwestern food plant almost one-third of its previous annual costs for pest control. A regular periodic program of fumigation with Liquid HCN was adopted throughout the plant—replacing a miscellany of methods previously used. Today the plant is reported uniformly free of insects and rodents that take a toll of profits.

• *Particulars on request.*

American Cyanamid & Chemical Corporation
INSECTICIDE DEPARTMENT
30 ROCKEFELLER PLAZA • NEW YORK, N. Y.
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detected by using a specific medium prepared by filling culture tubes about half full of finely chopped spiced ham from a sound can and wetting down the meat with a solution containing 0.4 percent sodium nitrate and 2 percent sucrose. The finished tube is autoclaved 15 minutes at a 15-lb. pressure and inoculated from a Pasteur pipette. Inoculated tubes are incubated at 99 and at 120 deg. F.

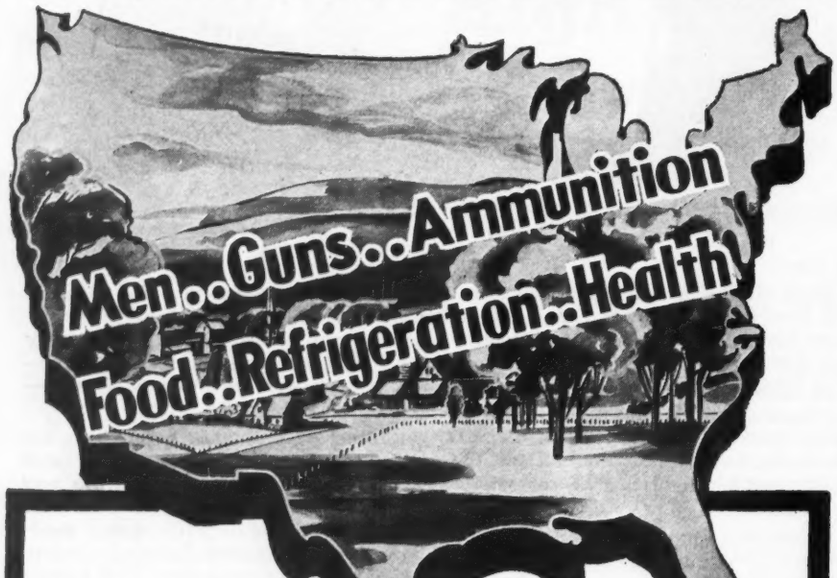
Digest from "Fermentation in Meat Products by the Genus *Bacillus*," by L. B. Jensen and W. R. Hess, *Food Research* 6, 75, 1941.

Heat Penetration In Meat Canned in Glass

IN A STUDY of the rate at which heat penetrates the meat when beef is canned in quart glass jars in a pressure cooker, it was found that the maximum thermal efficiency was only about 48 percent. After 50 minutes in the cooker the efficiency was only 10 percent, but it rose rather rapidly to 48 percent at 90 minutes, remaining at that level until the end of the test (129 minutes). For home canning of beef in glass it is recommended that the pack should be preheated at 86 deg. F., then heated 90 minutes in the cooker at a 15-lb. steam pressure.

Digest from "Effectiveness of Heat Penetration in Meat Canned in Glass Jars in a Pressure Cooker," by C. I. Nelson and Darline Knowles, *Journal of Agricultural Research* 61, 753, 1940.

Our Nation's First Line of Defense



AMERICAN Industry is striving to produce all the needed materials. As representatives of American Industry we are, too. Ordnance is a direct necessity *and we are proudly producing that.*

Refrigeration equipment for Army, Navy, and Marines to preserve their food is necessary too, *and we are proud to produce that.*

Refrigeration equipment *to preserve food in process, in transit, and in storage until needed by millions of defense workers and plain citizens* is an important function of ours too. This we are doing, not "as usual" but under pressure of time and need.

Carry on we must, with head up and eyes forward, Working, Healthy, Confident.

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Superior Since 1867
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Refrigeration... Air Conditioning

Offices in principal cities

PACKAGING

Packaging Materials For Frozen Foods

CARTON BOARD MATERIALS and wrapper foils have been tested for moisture retention properties when used for packaging frozen fruits and vegetables. The average moisture penetration through coated carton boards at 0 deg. F. is 0.15 gram per 1,000 sq. cm., while impregnated board allows slightly more penetration (0.24 gram). The coating or impregnating material must be one which will not crack or crystallize at storage temperatures. A heavy coat of waterproof material is neither necessary nor desirable. Numerous moistureproof wrapping materials of the waxed paper, viscose foil and rubber derivative types were tested. In general, these materials, if properly applied and carefully sealed, allow less than 0.5 percent moisture loss from the packaged goods in 9 months at 0 deg. F. But crease resistance is a factor to be remembered, since a foil which ceases to be impermeable along creases loses part of its protective capacity. The viscose type moistureproof foils and laminated rubber sheets have good crease resistance.

Digest from "Some Observations on the Materials Employed in Packaging Frozen Foods," by Wm. Rabak. *Proceedings of the First Conference,* Institute of Food Technologists, 1940, p. 193.

Dry Foods in Paper Containers

MOISTURE PERMEABILITY tests have been made with regenerated cellulose foil (not moistureproofed) 0.9 mil thick, glassine 20 lb., dry waxed sulphite (37 lb. waxed to 45 lb.), cellulose acetate 0.88 mil thick, moistureproofed regenerated cellulose 1 mil thick, and rubber hydrochloride 1 mil thick. The effects of rising temperature, rising atmospheric humidity and simultaneous increase of both variables were studied with respect to rate of water-vapor transfer through the foil. When both variables were changed, the vapor-pressure gradient across the foil was kept constant. Regenerated cellulose is regarded as a sorbing material, cellulose acetate and rubber hydrochloride are nonsorbing, while

waxed paper and moistureproofed regenerated cellulose are sorbing materials with a nonsorbing coating. Sorbing materials pass water vapor more rapidly as humidity rises, and the increase in permeability is faster than with nonsorbing materials. The coated materials are complex in their relations between humidity and passage of water vapor.

Digest from "Studies on Water Vapor Permeability of Paper Containers for Dry Foods." by G. J. Brabender, *Proceedings of the First Conference,* Institute of Food Technologists, 1940, p. 227.

PRESERVING

Engineering In Jelly Manufacture

FROM the chemical engineering standpoint, jelly making involves a unit process (hydrolysis) and a unit operation (evaporation). Batch methods have been employed hitherto in cooking the fruit, filtering the pulp and cooking the clean juice. Rate of evaporation must be high enough to coagulate albuminoids by the time the desired density is reached. Hydrolysis must be fast enough to invert so much sugar that the finished jelly will not crystallize.

With these requirements in mind a new continuous jelly-cooking process has been developed. Since no inexpensive continuous proportioner was avilable to weigh out the sugar, measure the juice and feed both to the evaporator in exactly correct proportions, it was necessary to design one. The new continuous jelly machine is in two parts, one to evaporate the juice, the other to regulate the rate and time of inversion. A mechanical skimmer to remove coagulated protein scum is another feature.

Digest from "Engineering a Continuous Evaporation and Hydrolysis Process," by Gustave T. Reich, *Proceedings of the First Food Conference,* Institute of Food Technologists, 11, 1940.

MISCELLANEOUS

Color in Fruit Products

FADING, browning and discoloration often have a harmful physiological, as well as psychological, effect in respect to the quality of fruit juices, dried fruits and other products. Carotenoids and riboflavin, which are important nutritional factors, are among the plant pigments which are destroyed in such color changes. Non-oxidative discoloration may be due to the formation of tin sulphide in canned fruits, or to decomposition of carbohydrates with formation of colored products. Oxidative discoloration may be catalyzed by enzymes or it may be autocatalytic. Browning of dried fruits such as apricots may occur even in vacuum-packed containers, aided by peroxides and by oxygen retained in the fruit itself. This darkening is very sensitive to temperature and may be practically eliminated at 0 deg. C., although it is fairly rapid at 20 deg. C.

Vitamin C is known to have antioxygenic properties, but its functions in discoloration of fruit products are not yet understood. Browning involves a loss in vitamin C content, perhaps by destruction while acting as an antioxidant. A special study of the effects of vitamin C and sulphur dioxide on darkening of orange and lemon juices showed that sulphur dioxide tends rather to retard than to accelerate oxidation of vitamin C. Differing from its behavior in other products, sulphur dioxide acts in citrus juices not only as an antioxidant but also as a preservative of vitamin C and color.

Digest from "Color Retention in Fruit Products," by M. A. Joslyn, *Industrial and Engineering Chemistry* 33, 308, 1941.

Citrus Pectates

INDUSTRIAL UTILIZATION of pectic acid and pectates offers a field of development which is practically untouched. Alkali reacts with pectin to form a type of pectate which was known in 1790. Protopectin yields a different pectate, more viscous in aqueous sols and giving a stringy instead of an amorphous precipitate with alcohol. Pectin solution extracted from citrus fruit pulp can be used to make the low-viscosity nonfibrous pectate. For high-viscosity fibrous pectate a ton of citrus pulp will yield about 200 to 280 lb. of pectate pulp containing 30 to 35 percent of sodium pectate. By boiling 2 parts of this pulp with 0.1 part tetrasodium pyrophosphate and 0.1 part sodium carbonate in 97.8 parts water a viscous crude dispersion is obtained which can be used directly for many purposes, or treated for production of calcium pectate or other pectates.

Pectate pulp and the pectates have many potential uses in industry. They prevent sticking of asphalt, tar, raw rubber, and the like, to containers. Their gel-forming property is useful in low-acid jellies, cream soups and certain milk products, and in sponge rubber. Added to quenching water for steel they control the severity of quench as desired. They are useful in emulsion paints and inks. Some of the metal pectates are effective catalysts for certain chemical reactions.

Digest from "Citrus Pectates: Properties, Manufacture and Uses," by W. E. Baier and C. W. Wilson, *Industrial and Engineering Chemistry* 33, 287, 1941.

50,000 Packages a Day! ...2 every second!

That's what LAMSON is doing for SPRAGUE-WARNER

Sprague-Warner, big Chicago wholesale grocers, called in Lamson Conveyor Engineers when their handtrucking was causing costly confusion . . . losing valuable time. Now 36 Lamson belt and gravity package conveyors have converted all motion into straight-line flow—*moving 2 packages per second!*

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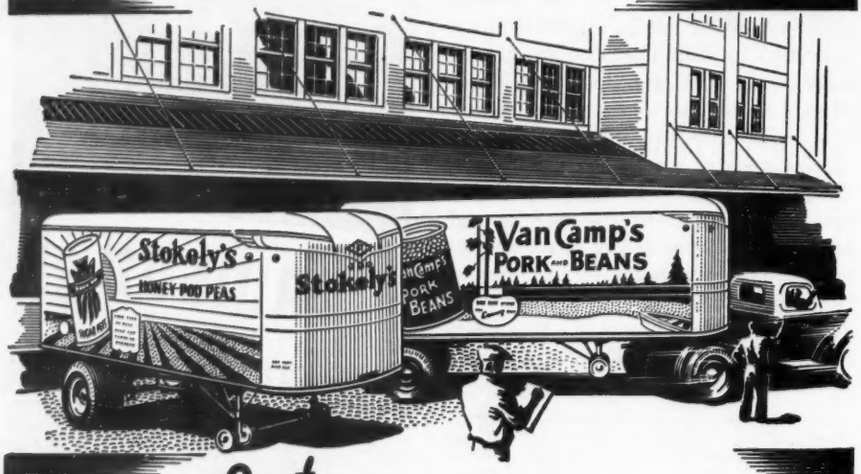


But THAT WAS ONLY THE START OF THEIR PROFITS FROM TRAILER HAULING!

• STOKELY-VAN CAMP, of Indianapolis, one of the world's largest canners of fruits and vegetables, and producers of the Stokely and Van Camp brands, bought their first Truck-Trailers in 1934. And immediately, they learned something important—*that Trailers would enable them to double their territory from each distributing point!*

SMALL TRUCK PULLS BIG LOAD

Why? Because they could profitably *pull a big load* with a small truck . . while a truck big enough to *carry* the same load would be unprofitable!

So now, Stokely-Van Camp use a fleet of 12-ton Fruehauf Trailers—pulled by economical 3-ton trucks—to carry produce to and canned goods from their 41 plants serving every corner of the United States...hauls ranging from "just around the corner" to 800 miles or more.

STILL FURTHER BENEFITS FROM THE "SHUTTLE SYSTEM"

• STOKELY-VAN CAMP learned how to benefit still further. Trucks idle during loading and unloading were unprofitable ... and on shorter hauls they were idle as much as half of the working time. So they adopted the "shuttle system" ... one truck handles three detachable Trailers. Truck and driver are constantly busy . . . while they're pulling one Trailer, the second is being loaded and the third unloaded. And, although shuttling is sometimes considered as a short or medium-haul operation, Stokely uses it on runs as long as Indianapolis-to-Chicago.

DON'T TIE-UP TRUCKS

Their executives say: "While loading and unloading our Trailers, we're not tieing up valuable trucks. You wouldn't hold a locomotive on the siding while loading a freight car, would you?"

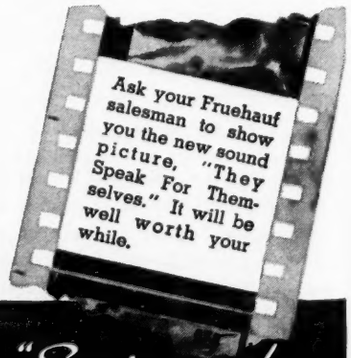
However much your hauling operations may differ, it's very likely that the Truck-Trailer method would be profitable for you, too! A Fruehauf engineer will gladly study your job and advise whether you can use Trailers to advantage. Why not call him . . . today?

World's Largest Builders of Truck-Trailers

FRUEHAUF TRAILER COMPANY • DETROIT

Sales and Service in Principal Cities

FACTORIES: DETROIT, KANSAS CITY, LOS ANGELES, TORONTO



FRUEHAUF TRAILERS *"Engineered Transportation"*

Books

How To Analyze Foods

FOOD ANALYSIS. By A. G. Woodman. Published by McGraw-Hill Book Co., 330 West 42d St., New York, N. Y. 1941. 596 pages; 6¾x9¾ in.; cloth. Price, $4.

This book, now in its fourth edition, gives typical methods for analyzing foods and tells how to interpret the results. It is primarily a brief treatise on a particular branch of analytical chemistry. And since it is written chiefly for students and beginners, some of the more complicated or difficult procedures used successfully by experienced analysts being purposely given only by reference.

For treatment in the book the author selected certain typical foods to illustrate important methods of food analysis, and a particularly wide variety of foods is not covered. However, fats and oils, carbohydrate foods and alcoholic beverages have been treated at some length.

The book starts off with chapters on general methods, the microscopical examination of foods, food colors and preservatives and chemical preservatives. Then follow chapters on the analysis of these foods: Milk, cream and ice cream; fats and oils; carbohydrate foods; cocoa and chocolate; spices; cider vinegar; flavoring extracts; and alcoholic foods. At the close of the book are 50 photomicrographs of practical value in food analysis.

Fertilizer Needs

HUNGER SIGNS IN CROPS. A symposium prepared by 15 experts in agronomy and published by American Society of Agronomy in cooperation with National Fertilizer Association. Distributed by National Fertilizer Association, Investment Building, Washington, D. C. 327 pages; 7x10¼ in.; cloth. Price, $2.50.

This is a handsomely illustrated volume showing the ways in which fertilizer shortage is identified by inspection of the crops. Food plant executives who have responsibilities in raw material production or procurement will find it a very valuable guide in their dealing with producers. It is both satisfying to the scientist and understandable for the layman.

New Facts for Freezers

COMPARATIVE STUDIES OF VARIETAL SUITABILITY FOR FREEZING PRESERVATION OF PEAS, GREEN OR SNAP BEANS, LIMA BEANS AND SWEET CORN GROWN UNDER EASTERN CONDITIONS. By Joseph S. Caldwell, J. M. Lutz, H. H. Moon and C. W. Culpepper. Published by the U. S. Department of Agriculture as Technical Bulletin No. 731, 1940. 72 pages; 6x9 in.; paper. Price, 10 cents; for sale by Superintendent of Documents, Washington, D. C.

As indicated by the title, this is a study of the behavior under freezing preservation of various varieties of the more important vegetable crops. Fairly large groups of varieties are reported upon.

Included in the studies is the effect of the stage of development and degree of maturity of the material on its behavior in freezing and on the table quality and palatability. Comparative studies were also made of preparatory treatments and of sizes and types of containers. Another object of the investigation was to obtain information as to the nature of the microorganisms present in the raw material and the effects of preparatory treatments and of freezing and storage on their number.

Power Industrial Trucks

MATERIAL - HANDLING HANDBOOK. Published by The Industrial Truck Statistical Association, 208 South LaSalle St., Chicago, Ill. 1940. 54 pages; 8½x11 in.; paper. Free.

Prepared as a practical guide for the analysis of materials-handling operations and the application of power industrial trucks, this handbook will be helpful to plant managers and engineers in the food industries. The book, of course, emphasizes power industrial trucks, but it contains much practical data. It has four sections, devoted, respectively, to the place of material handling in industrial management, materials-handling management, organizing an industrial truck handling system and practical truck engineering.

Information on Hygiene

A PRELIMINARY SURVEY OF THE INDUSTRIAL HYGIENE PROBLEM IN THE UNITED STATES. Public Health Bulletin No. 259 of the U. S. Public Health Service. 132 pages; 9x5¾ in.; paper. Price, $0.20; for sale by Superintendent of Documents, Washington, D. C.

Field work and plant surveys in 15 states form the basis of this analysis of the development and progress of industrial hygiene. Included in the surveys are existing health services in plants, exposure to materials and conditions which might influence health and an inventory of control methods in use. Safety provisions, medical provisions and other needs of industrial hygiene are presented in a health program for industry integrated with community health service.

Technologists Analyze Problems

(*Continued from 45*)

Any process that does not, by its very nature, preclude continuous methods, may be set up on either basis, depending upon economical advantage. Continuous operation has the advantage of reduction in labor costs over batch operation, and may result in keeping power loads more uniform. Also, continuous equipment may require less floor space per unit of capacity, but may involve increased first cost because of special design complications. Batch operation gives greater flexibility of capacity and diversity of equipment uses.

Mr. James stated that continuous processes for bleaching, winterizing, and hydrogenating edible vegetable oils have been designed, but have not been successful in this country. A method for continuous deodorizing, making use of the petroleum bubble tower principle, has been developed, is in use, and shows important operating economies.

Mr. Merrill reported results of studies to show that where the chlorination of cooling water for hermetically sealed containers is practiced, the objective should be to reduce the bacteria count of the water to the level of potability. The chlorine residual should be liberal, as compared to that of drinking water; one part per million has been found practicable.

Packaging and Storage

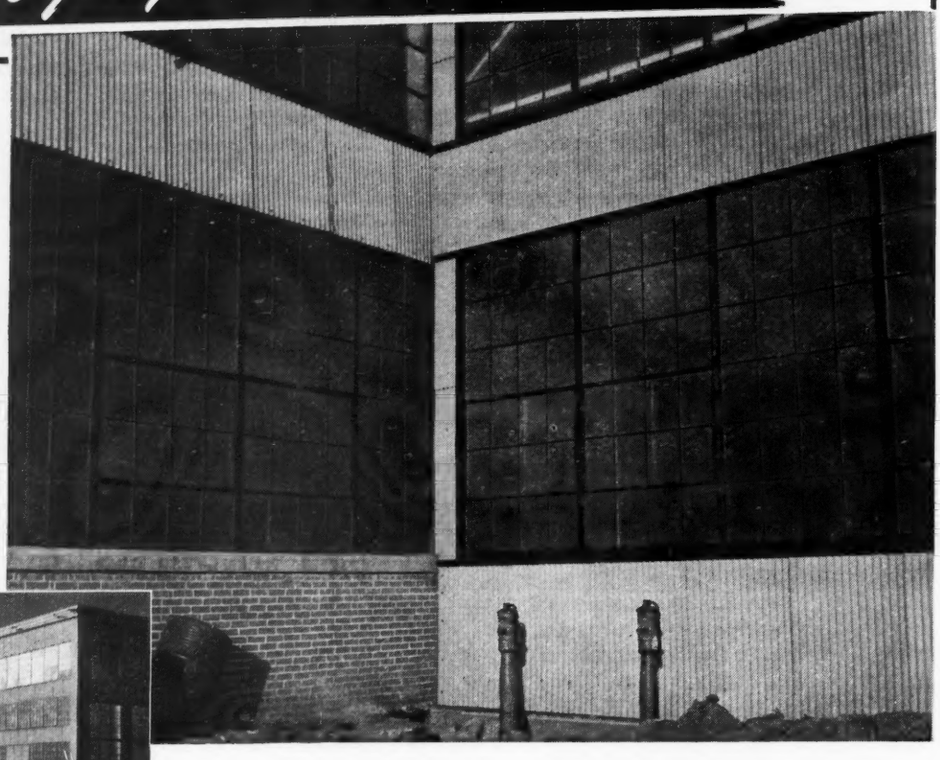
A session on packaging and storage, under the chairmanship of T. M. Rector of General Foods Corp., heard papers by C. A. Southwick, General Foods Corp.; W. C. O'Kane, University of New Hampshire; and by C. S. Pedersen and H. G. Beattie, New York Agricultural Experiment Station, and E. A. Beavens, U.S.D.A.

Current trends in packaging were covered by Mr. Southwick, who pointed out the trend towards complex and unstable food products. For that reason, protection against change of state is of growing importance in packaging. Precooked and desiccated foods require better protective materials. Cheaper packages than glass or tin, in the form of transparent sheetings, or treated paper and board, meet this need. Weld-like heat seals make continuous seaming possible for the manufacture of flexible packages capable of holding free liquids.

Mr. O'Kane recommended organized study of insect infestation problems and that systematic control measures be employed in connection with food manufacture and handling. Methyl bromide and ethide, a chlorinated nitro-paraffin derivative, were cited as the newest mate-

CATERPILLAR TRACTOR CO. JOINS NEW WALL OF K&M *"Century"* ASBESTOS CORRUGATED TO ONE 4 YEARS OLD

. . . can you pick the new wall?



Unretouched photograph of the junction of two buildings in the Caterpillar Tractor Co. Plant. The siding of both is K&M "Century" Asbestos Corrugated. The four-year-old material on the left is indistinguishable from the new siding on the right-hand building. Material applied by J. W. Bushell Company, Peoria, Ill.

Only a lucky guess could pick the brand new wall of Keasbey & Mattison "Century" Asbestos Corrugated in the photograph above. And the camera doesn't lie, because there is no discernible difference between the old and the new.

After four years' experience with "Century" Corrugated on the sidewalls of one of their buildings, the Caterpillar Tractor Co. of Peoria, Ill., again used this material for a large new addition to their plant. Low upkeep was the reason . . . the same reason which has influenced scores of other large industries to build with "Century" Corrugated.

"Century" Corrugated is known the nation over as a maintenance-free material for sidewalls and roofs alike. It is fire-resisting, weather-resisting, rot-proof and rust-proof. It keeps building maintenance lastingly low, for the passage of time only toughens it. And it is so easily handled and applied that it greatly speeds up construction. FREE: Write Dept. 05 for new, 36-page catalogue.

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rials now being used in food fumigation.

The paper by Pedersen, Beattie and Beavens reported results of hot, cold and freezing extraction of juices from various fruits. Hot extractions usually result in greatest yields, best color and greatest viscosity. Cold extraction usually gives more nearly the typical fruit flavor. Freezing extraction is applicable to strawberries and raspberries, and usually results in typical fruit flavor of cold pressed juice with yield, color and viscosity of hot pressed juice.

At the annual banquet, Dr. Morris Fishbein, editor of the *Journal of the American Medical Association*, delivered an address on "National Nutrition" in which he condemned food fads and stressed the need for a commonsense factual approach to nutrition problems.

Session on Flavor

In a session devoted to protection and improvement of flavor, under the chairmanship of E. C. Crocker of A. D. Little, Inc., Cambridge, Mass., papers were presented by the chairman, C. L. Arnold, Kroger Food Foundation, Crosby Gaige, consultant, Bernard H. Smith, Virginia Dare Extract Co., and by H. F. Willkie and E. H. Scofield, Jos. E. Seagram & Sons. Mr. Arnold described the technic of consumer testing as developed by Kroger. This method makes use of a carefully selected testing panel of housewives, located in eleven districts.

Mr. Smith reviewed the increasing difficulty of obtaining flavoring materials from abroad and the steps that are being taken to produce many of these products in the United States or, at least, in the Western Hemisphere.

A highlight of this session was an address by Crosby Gaige that might have been entitled "know your onions." In a witty and vigorous manner, Mr. Gaige made a plea for food manufacturers to produce better cooked and better flavored foods. Good eating is to be considered a fine art and the food manufacturer who promotes this art by avoiding the production of insipid and unappetizing foods will benefit his own business and the world besides.

Officers elected for the calendar year 1942 included: President, L. V. Burton, Editor, FOOD INDUSTRIES; vice-president, E. H. Harvey, director of research, Anheuser-Busch, Inc.; secretary-treasurer, G. J. Hucker, New York Agricultural Experiment Station; councillors: C. O. Ball, American Can Co.; C. H. Bailey, University of Minnesota; R. A. Dutcher, Pennsylvania State College; F. F. Fitzgerald, American Can Co.; and D. K. Tressler, New York Agricultural Experiment Station.

Patents

Oil Extracted from Animal and Fish Viscera by Producing Emulsion With Oil Solvent—Harden F. Taylor and Robert H. Bedford, to Atlantic Coast Fisheries Co., New York, N. Y. No. 2,240,232. April 29, 1941.

Meat and Other Foodstuffs Protected During Cold Storage by Enclosing in Unvulcanized Rubber Container Capable of Shrinking When Heated—Henri Marie Joseph Tyrel de Poix, Rueil, France, to Dewey and Almy Chemical Co., Cambridge, Mass. No. 2,240,245. April 29, 1941.

Corn Flakes and Similar Products Toasted or Lightly Baked During Subjection to Recirculated Current of Hot Combustion Gases—Eugene Oscar Engels to Baker Perkins, Inc., Saginaw, Mich. No. 2,240,291. April 29, 1941.

Dry Animal Casings Printed by Applying a Heated Die to a Coat of Heat-transferable Surface Previously Applied to Casing—John H. Payton to Armour and Co., Chicago, Ill. No. 2,240,348. April 29, 1941.

Animal Tissue Given Improved Physical Properties by Treatment With Macin—John M. Ramsbottom, to Industrial Patents, Corp., Chicago, Ill. No. 2,240,518. May 6, 1941.

Meat Cured by Pumping With Aerated Used Pickling Brine—Walter Richard Hess, to Industrial Patents Corp., Chicago, Ill. No. 2,241,030. May 6, 1941.

Juice Extracted From Citrus Fruits During Passage of Fruit Sections Through Primary and Secondary Pairs of Extracting Rolls—William E. Clark, Winter Haven, Fla. No. 2,241,081. May 6, 1941.

Flour Packed in Vented Container With Trap Device to Prevent Sifting Out of Flour Contents—Earl C. Garratt, to Kansas Flour Mills Corp., Kansas City, Mo. No. 2,241,085. May 6, 1941.

Peeled Potatoes Treated With 2 Percent Sodium Metabisulphite Solution for 10 Min. to Prevent Darkening—Joseph L. Williams, Seattle, Wash., No. 2,241,436. May 13, 1941.

Meat Slices Slit into Separate Strips by Mechanically Driven Adjustable Knives—Joseph P. Spang, Quincy, Mass., to Cube Steak Machine Co., Inc., Boston, Mass. Nos. 2,241,648; 2,241,649; 2,241,650. May 13, 1941.

Vegetable Foods Finely Ground and Dehydrated to be Packaged and Stored at Approximately 70 Deg. F. Without Loss of Food Value and Vitamin and Carotene Content—Gerald D. Arnold, Wauwatosa, Wis. No. 2,241,654. May 13, 1941.

Nut Meats Detached and Separated From Shells of Cracked Nuts by Series of Mechanical Rotary Beaters—Felix B. Romberg, Holland, Tex. No. 2,241,737. May 13, 1941.

Malted Milk Beverage Made to Contain Not More Than 7.5 Percent Milk Serum Solids and Not Less Than Approximately 6.5 Percent—Martha E. Tucker to Martha Tucker Mal-Tee Corp., Grand Rapids, Mich. No. 2,241,971. May 13, 1941.

Watermelon Meat Dried, Powdered, Soaked in a Fat Solvent and Filtered Free of Solvent and Fats Preliminary to Drying and Soaking of Residue in Water for 24 hr. Preparatory to Re-filtering and Drying and Subsequent Extraction With Solvent of the Ether, Acetate or Alcohol Groups—Matthew Evertz, Chicago, Ill. No. 2,242,062. May 13, 1941.

Vegetable Oils Containing Gums Treated With Water Solution of a Salt Other Than of the Alkali Metal Halides and Strongly Alkaline Groups and Centrifuged for Removal of Precipitated Gums—Benjamin H. Thurman, Bronxville, N. Y., to Refining, Inc., Reno, Nev. No. 2,242,188. May 13, 1941.

Fruit Cored by Mechanically Driven Spoon—Mark Ewald, Olympia, Wash., to Special Equipment Co., Portland, Ore. No. 2,242,241. May 20, 1941.

Fruits, Cut-in-Half, Mechanically Held in Position While Core or Seed Portion is Automatically Removed—Mark Ewald and Henry Skog, Olympia, Wash., to Special Equipment Co., Portland, Ore. Nos. 2,242,242 and 2,242,243. May 20, 1941.

Fruit Mechanically Cut Into Half-sections While Moving in Horizontal Plane and Placed Upon Spreader for Delivery to Holding Mechanism—Mark Ewald, Olympia, Wash., to Special Equipment Co., Portland, Ore. No. 2,242,244. May 20, 1941.

Skinned Animal Carcass Covered With Brine-moistered Cloth While Still Warm Preparatory to Chilling, Removal of Cloth and Covering With Transparent Cellulosic Wrapping Made to Adhere Tightly to Carcass by Covering With Tight Fitting Cloth—Andrew S. Hartanov, to Swift and Co., Chicago, Ill. No. 2,242,300. May 20, 1941.

Eggs Candled, Filled Into Cartons and Packaged by Continuous Mechanical Means—Harry C. Johnson, to Self-Locking Carton Co., Chicago, Ill. No. 2,242,304. May 20, 1941.

Macaroni Made on Automatic Continuous Operating Machine—Cesare Montanari, Milan, Italy. No. 2,242,364. May 20, 1941.

Hog Carcasses Given Wax-like Coating For Hair Removal—Walter L. McCaslin, to Armour & Co., Chicago, Ill. No. 2,242,402. May 20, 1941.

Meat Frozen Solid Preparatory to Slicing, Stacking to Form Pack of Desired Thickness, Subsequent Thawing to Make Slices Adhere, and Sealing in Packages With Juices Retained—John W. Carpenter, Independence, Mo. No. 2,242,451. May 20, 1941.

Packaged Foods Frozen in Continuous Manner While Passing Through Compartment Having Series of Refrigerated Plates With Radiation Fins on Plate Faces—Frank W. Knowles, Seattle, Wash. No. 2,242,527. May 20, 1941.

Gelatine Given Improved Whipping Qualities by Treatment With Artificially Produced Ultraviolet Rays—Donald P. Grettie to Industrial Patents Corp., Chicago, Ill. No. 2,242,883. May 20, 1941.

Juice Extracted From Lemons by Depressible Tubular Coring Device—George E. Wilson, to Wilson Citrus Fruit Juice Extracting Machine, Inc., Fort Lauderdale, Fla. No. 2,243,025. May 20, 1941.

Cheeses Given Yarn Winding by Automatic Means—Edward Kinsella, Spondon near Derby, England, to Celanese Corp. of America. No. 2,243,101. May 27, 1941.

Canadian Patents

Flour Bolted Through Truncated-cone-shaped Screen Equipped With Paddles Carried on Truncated Cone Revolving Inside Screen—Joseph Maheux, dit Blanchet, St. Frederic, Que. No. 395,252. March 18, 1941.

Ice Cream Cones Protected From Accidental Withdrawal of Jacket by Nesting Ring Near Cone Tip—Jas. Belton, to Maryland Baking Co., Inc., Baltimore, Md. No. 395,325. March 18, 1941.

Eggs Fed to Shell-perforating Machine in Cups Mounted on Rotary Conveyor—Geo. T. Thomas, Denville, N. J. No. 395,423. March 25, 1941.

Heat Transferred From Hot Sugar Worts to Percolation Water by Evaporation and Condensation in Successive Stages in Acid Saccharification of Cellulose—Max Seidel, Solln near Munich, Germany. No. 395,532. March 25, 1941.

Fruit Vinegar Made by Fermenting Low-alcohol Fruit Wine Fortified With Fermentable Sugar—Hans Mostny, Dodoy Cruz, Mendoza, Argentina. No. 395,676. April 1, 1941.

Apple Juice Fortified With Synthetic Ascorbic Acid, Freed From Oxidase, Pasteurized and Canned in Absence of Air—Wm. D. McFarlane, Ste. Anne de Bellevue, Que., and Malcolm B. Davis, Ottawa, Ont., to Deputy Minister of the Department of Agriculture of the Dominion of Canada, Ottawa, Ont. No. 395,770, April 8, 1941.

Cheese Protected by Removable Flexible Wax Coating Applied First as Film of Tacky Amorphous Petroleum Wax and Then as Film of Nontacky Crystalline Petroleum Wax—Edward C. Ennis, Chicago, Ill. No. 395,794. April 15, 1941.

CONVOY

Food industries entrusted with the convoying of vitamins in foods to the public's digestive tracts have new high responsibility since proper health defense calls for correction of proved widespread vitamin deficiencies. Where the courses of some vitamins are beset by particularly strong "enemy" forces some losses may be unavoidable: as those due to enzymatic processes, heat, oxidation, home cooking methods, etc. Proper high vitamin values may nevertheless now be delivered at the end of the journey, thanks to the possibility of augmenting native vitamin forces with added amounts produced synthetically at low cost. • Make Roche Park your central source for pure crystalline vitamins B_1, B_2, C and nicotinic acid. Write to our Vitamin Division for help on technical problems and cost calculations.

HOFFMANN-LA ROCHE, INC. • NUTLEY, N. J.

World Famous for Pharmaceutical Fine Chemicals

Formulas for Foods

English Marmalade*

By H. B. CRONSHAW, *London, England.*

General Instructions

FORMULA NO. 205

FOR marmalade the bitter Seville or Malaga oranges are used. Sweet oranges are unsuitable as they give an opaque, waxy-looking product with bland taste. It is common practice to incorporate a certain proportion of lemons, say up to 10–25 percent of the total fruit used.

The fruit is first sorted, and any damaged or otherwise unsuitable fruit picked out. Fruit with extra good skins should be reserved for supplying the shreds for jelly marmalade. Ordinary marmalade requires unblemished fruits of correct ripeness; fruit that is not quite up to this standard may go for preparing the juice for jelly marmalade.

The main grouping of marmalades is into ordinary marmalade and jelly marmalade, and the manufacturing processes differ accordingly.

Ordinary Marmalade

The oranges (suppose it is a 5-cwt. batch) are scrubbed clean in hot water and the peel removed by hand or machine. In the latter case the whole fruit is cut into halves by an orange halving machine and the dummies scooped out by a reaming or gouging machine. The operations washing, halving and gouging may, however, be performed by a line of automatic machinery in the case of continuous large-scale production. In the older hand method, a quartering knife is used to slit the peel into four segments which are then removed to leave the whole dummy. This operation may be facilitated by some simple device such as an aluminum V-shaped frame fitted with two adjustable knives, or the fruit may be rolled over the tip of a knife driven through a table from below.

The dummies and peel then receive separate treatments. The dummies (*i.e.*, whole, raw pulp) are placed in a vat (or the classic "steaming barrel") fitted with open steam coils and enough water added to cover them. Steam is turned on and the mass gently boiled until the pips (seeds) are loosened. Boiling must not be carried too far or the pips become broken in the pulping machine used later and give a white-spotted marmalade. The boiled material is then passed through a pulping machine, or a centrifugal machine, to remove the pips, and the pulp collected in a vat of suitable size (in this case, one to hold 80 gal.).

The peel removed from the batch of fruit is passed through a peel chipping machine (or "chipper"), the thickness of the cuts being readily adjustable. The resulting chips are placed in a steam pan, *i.e.*, steam-jacketed kettle (or vat with open coil), covered with water and boiled until tender. Some manufacturers cook the peel before cutting. It should be noted that for ordinary marmalade the whole peel (*i.e.*, red rind and white pith) is cut, whereas for jelly marmalade the pith is discarded and only the rind is cut.

After draining, the chips are added to the pulp and well mixed. It is now necessary to add a quantity of hot water (or the filtered drainings from the chips after boiling) which will bring the mixture to a known, uniform concentration in terms of the whole fruit in order to ensure uniformity in the finished marmalade (*e.g.*, for the 5-cwt. batch of whole fruit, the mixture of pulp and chips is made up to 80 gal.; thus each gallon is now equivalent to 7 lb. of whole fruit).

Finally the pulp-chip mixture is boiled with sugar sirup, and possibly pectin. Assuming each gallon of the pulp-chip mixture is equivalent to 7 lb. of whole fruit, the following proportions may be used:

	I	II	III	IV
Pulp-chip mixture...	4 gal.	3 gal.	3 gal.	2 gal.
Sugar.....	56 lb.	60 lb.	56 lb.	56 lb.
Water.....	2 gal.	4 gal.	3 gal.	4 gal.
Pectin (liquid).....	.....	.....	3 lb.	6 lb.

Bring the water to boiling point in a steam-jacketed pan. Add the sugar; boil and skim (or, better, use filtered sirup prepared separately). Add the pulp-chip mixture and boil to 222½ deg.–223 deg. F. In the case of pectin, this is added during boiling and before the maximum temperature is reached.

One authority (J. W. Black) has recommended the following finishing temperatures and corresponding total soluble solids: Marmalade for home trade, 222 deg. F. and 67–69 percent soluble solids; export marmalade, 225 deg. F. and 70–72 percent; cheap grade, 218 deg. F. and 64–65 percent. First boilings should be checked on a refractometer, but a continuous series of such readings is better. They can be expressed in terms of thermometer readings. In order to guard against crystallization in export marmalade, it is advisable to invert a portion of the sugar.

Jelly Marmalade

Two methods may be given to illustrate the preparation of jelly marmalade.

Method No. 1

The dummies are removed from a batch (say, 5 cwt.) of clean oranges, and they are weighed. To each 112 lb. of dummies add 22 gal. of water and simmer for 45 minutes. Then pass through a filter (the older method was to use lamb's wool bags filled with filter paper). To the juice add 170 lb. of sugar and 10 lb. of glucose. Raise to boiling point and filter bright.

Distribute the mixture of juice and sirup among four steampans. To each add 2 lb. of siruped shreds (see below) which have been drained. Boil to 223 deg. F. Cool before filling to prevent floating of the shreds.

The peel required for jelly marmalade amounts to about one-quarter of the total removed from the batch of oranges. The quartered peel is shredded in a peel shredding machine (or "shredder"), whereby the white pith is first stripped from the rind and the latter is then cut up into the required sizes, the machine being adjustable as to amount of white removed and to thickness of shreds. Provision is also made for collection of the orange oil liberated while cutting. The shreds are just covered with water and kept so covered while they are boiled in a steam pan until tender. They are then slowly cooled and drained, and afterwards placed in a cold sugar sirup of 20 deg. Bé. They are allowed to remain in this for 24 hours, after which both shreds and sirup are transferred to a pan, boiled and filled hot into jars or small casks for storage until required. The siruping process can, of course, be carried further if desired, by running off

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the sirup on succeeding days, adding more sugar and boiling, and then returning to the shreds, until the cold sirup contains approximately 66 percent sugar.

Method No. 2

The second method employs an arrangement of plant described in the article on jam making, under the subheading, Semi-automatic System (FOOD INDUSTRIES, May, 1941, page 74; June, page 71). The fruit is reduced to a pulp by passing through a fruit cutting machine, or a special pulping machine. The oranges and lemons may be pulped together, but there is an advantage in keeping the pulps separate in case the recipe has to be modified.

The pulp is mixed in accordance with the recipe and charged into the autoclave together with an addition of water from the calibrating tank to reduce the fruit content to about 60 percent of the pulp strength. After cooking, the content of the autoclave is passed through the coarse and fine filters. The final clarified juice should have an actual fruit value of about 25 to 30 percent.

The peel is shredded and siruped as described under Method No. 1.

The sugar sirup is prepared in a steam-jacketed pan of, say, 4- or 6-cwt. capacity and then filtered. Assuming the sirup contains 66 percent of sugar, the juice and sirup are mixed in the proportions of 55–70 lb. of juice to 100 lb. of sirup.

The mixture is heated in the boiling pan (steam kettle), and a few minutes before the maximum temperature is reached, 1 to 1¾ lb. of shreds is added. As the jelly marmalade is discharged from the pan, it is common practice to add the oil collected while shredding the peel.

This oil should be mixed with a suitable solvent (to prevent floating on the surface of the jelly); also, it may be fortified by mixing with some purchased bitter orange oil, blended perhaps with a little sweet oil of orange.

One of the points to be watched in the preparation of jelly marmalade is the avoidance of metallic contamination of the juice, which produces a nauseating, bitter flavor and, eventually, cloudiness of the jelly.

Any surplus peel from jelly marmalade making may be put into brine for the preparation of candied peel. Or it can be used for marmalade by the purchase of dummies. Some manufacturers used to remove the rind in spiral form, hang it up to dry and sell it to manufacturing chemists. The solid matter from the filters (or "baggings") may be utilized for a cheap grade of marmalade. The material is boiled with water and passed through a pulping machine to take out the pips. In this case pectin must be used in the recipe. As for waste

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pips, it is said that these are used in Spain for feeding goats and turkeys; as they contain a certain amount of pectin, this might be worth extracting in some cases.

EDITOR'S NOTE:—*Formulas for special types of English marmalades will be published in subsequent issues of* FOOD INDUSTRIES.

FORMULA NO. 206

Braunschweiger No. 2

Pork livers	60 lb.
Skinned jowls	40 lb.
Dry milk solids	3½ lb.
Salt	3 lb.
White pepper	6 oz.
Marjoram	1 oz.
Mustard (ground)	2 oz.
Onions	3 lb.

Slash livers and soak in cold water for 2 hours. It is best to keep them in cooler while soaking. Place livers in silent cutter, add onions and dry milk. Chop fine, then add skinned jowls and spices. Chop all fine. Care must be taken not to get the mixture too warm while chopping.

Stuff in sewed hog bungs. After stuffing cook about 1½ to 2 hours at 160 deg. F. Chill quickly in ice water. When chilled, hang up to dry, then hang in smokehouse and give as cool a smoke as possible. When the desired color is obtained take out and cool gradually.

See also General Directions (Formula No. 27).

Formula from Dry Milk Institute

FORMULA NO. 207

Silver Doughnut Glaze

Glucose	1 lb. 4 oz.
Salt	1 oz.
Water	4 lb. 8 oz.

Add glucose and salt to water. Heat to boiling and remove from fire.

Gelatine	1 oz.
Water, cold	8 oz.

Stir gelatine into the cold water. Let stand about 5 minutes, or while glucose-water sirup is heating to a boil.

Add gelatine solution to the hot sirup immediately after removing from the fire. Stir until gelatine is thoroughly dissolved in the hot sirup.

Sugar, XXXX (sucrose)	20 lb.
Vanilla extract	1 oz.
Total weight of mix	26 lb. 7 oz.

Sift sugar to remove all lumps. Stir while slowly pouring the *hot* gelatine-glucose solution on the sugar. Mix thoroughly. Cool to about 120 deg. F. to use.

Suggestions for Use

Doughnuts give off considerable moisture while cooling. A good glaze can be ruined by dipping doughnuts while too warm. For best results, cool doughnuts to about 110 deg. F. and have the glaze at about 120 deg. F. Dip the doughnuts and lift them out immediately to drain on wire screens or racks.

If the glazed doughnuts are packaged, they must not be placed in airtight packages. For this will promote sweating and soaking the glaze.

FORMULA NO. 208

Caramel Fudge Icing

Homemade fudge icing (Formula No. 195)	3 lb.
Caramel base (Formula No. 203)	2 lb. 8 oz.

Mix together thoroughly for 3 minutes on medium speed. Then add and mix smooth.

All-purpose vegetable shortening	8 oz.

Keep icing at 110 deg. F. over hot-water bath when using, to get a fine glossy appearance.

When reheating, always use a hot-water bath, never a direct flame.

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